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DEPARTMENT OF AGRICULTURE.

BULLETIN No. 177.

PROCEEDINGS

OF THE

THIRTY-SECOND ANNUAL MEETING

OF THE

Pennsylvania State Board of Agriculture.

HELD IN

CHESTNUT STREET HALL, HARRISBURG, PA.

JANUARY 26 and 27, 1909.

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VIRTUE
LIBERTY AND
INDEPENDENCE

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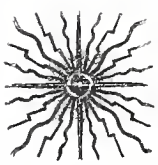

MEMBERS

OF THE

PENNSYLVANIA STATE BOARD OF AGRICULTURE,

FOR THE YEAR 1909.

Members Ex-Officio.

HON. EDWIN S. STUART, Governor.
HON. HENRY HOUCK, Secretary of Internal Affairs.
DR. N. C. SCHAEFFER, Superintendent of Public Instruction.
DR. EDWIN EARLE SPARKS, President of the State College.
HON. ROBERT K. YOUNG, Auditor General.
HON. N. B. CRITCHFIELD, Secretary of Agriculture.

Appointed by the Governor.

Gen. James A. Beaver, Centre County, ...Term expires 1910
R. I. Young, Middletown, Dauphin County, ...Term expires 1911
R. H. Thomas, Jr., Mechanicsburg, Cumberland County, ...Term expires 1912

Appointed by the State Poultry Association.

J. D. Nevius, ...Philadelphia, ...1910

Elected by County Agricultural Societies.

			Term expires.
Adams,	A. I. Weidner,	Arendtsville,	1912
Allegheny,	A. J. Purdy,	Imperial R. D. No. 1,	1912
Armstrong,	S. S. Blyholder,	Neale,	1911
Beaver,	A. L. McKibben,	New Sheffield,	1911
Bedford,	David W. Lee,	Bedford,	1912
Berks,	H. G. McGowan,	Geiger's Mills,	1910
Blair,	Howard Cox,	Bellwood,	1911
Bradford,	Edwin Platt,	Wysox,	1910
Bucks,			
Butler,	N. F. Bartley,	Euclid,	1911
Cambria,	H. M. Gooderham,	Patton, R. F. D.,	1910
Cameron,			
Carbon,			
Centre,	John A. Woodward,	Howard,	1912
Chester,	M. E. Conard,	Westgrove,	1912
Clarion,	S. X. McClellan,	Knox,	1910
Clearfield,	E. M. Davis,	Grampian,	1910
Clinton,	J. A. Herr,	Millhall. R. F. D.,	1911
Columbia,	A. P. Young,	Millville,	1912
Crawford,	J. F. Seavy,	Saegerstown,	1911

			Term expires.
Cumberland,			
Dauphin,			
Delaware,	E. J. Durnall,	Swathmore,	1911
Elk,	John M. Witman,	St. Mary's,	1911
Erie,			
Fayette,			
Forest,			
Franklin,	John P. Young,	Marion,	1911
Fulton,	J. L. Patterson,	McConnellsburg,	1910
Greene,	N. M. Biddle,	Carmichaels,	1910
Huntingdon,	Geo. G. Hutchison,	Warrior's Mark,	1912
Indiana,	S. M. McHenry,	Indiana,	1910
Jefferson,	Peter Cowan,	Brookville,	1910
Juniata,	Matthew Rodgers,	Mexico,	1912
Lackawanna,	Horace Seamans,	Factoryville,	1910
Lancaster,			
Lawrence,	Samuel McCreary,	Volant,	1909
Lebanon,	H. C. Snavely,	Cleona,	1910
Lehigh,	P. S. Fenstermaker,	Allentown,	1912
Luzerne,			
Lycoming,	A. J. Kahler,	Hughesville,	1912
McKean,			
Mercer,	W. C. Black,	Mercer,	1911
Mifflin,	M. M. Naginey,	Milroy,	1910
Monroe,	R. F. Schwarz,	Analomink,	1911
Montgomery,	J. Sexton,	North Wales,	1911
Montour,			
Northampton,	C. S. Messinger,	Tatamy,	1912
Northumberland,	I. A. Eschbach,	Milton, R. F. D.,	1911
Perry,	A. T. Holman,	Millerstown,	1910
Philadelphia,	Edwin Lonsdale,	Girard College, Phila.,	1910
Pike,			
Potter,	H. H. Hall,	Ellisburg,	1909
Schuylkill,	W. H. Stout,	Pinegrove,	1910
Snyder,	J. F. Boyer.	Middleburg, R. F. D. No. 4,	1909
Somerset,	John C. Weller,	Rockwood,	1911
Sullivan,	E. R. Warburton,	Campbellville,	1912
Susquehanna,	Frank A. Davies,	Montrose,	1910
Tioga,	E. B. Dorsett,	Mansfield,	1911
Union,	J. Newton Glover,	Vicksburg,	1911
Venango,			
Warren,	R. J. Weld,	Sugargrove,	1911
Washington,	D. S. Taylor,	Burgettstown,	1911
Wayne,	Warren E. Perham,	Niagara,	1910
Westmoreland,	M. P. Shoemaker,	Greensburg,	1910
Wyoming,	D. A. Knuppenburg,	Lake Carey,	1910
York,	G. F. Barnes,	Rossville,	1911

OFFICERS.

PRESIDENT.

Hon. Edwin S. Stuart, Governor, ...Harrisburg.

VICE PRESIDENTS.

J. A. Herr, ...Millhall, R. F. D.
S. M. McHenry, ...Indiana.
Jason Sexton, ...North Wales.

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P. S. Fenstermaker, Chairman, ...Allentown.
H. C. Snavely, ...Cleona.
E. M. Davis, ...Grampian.
H. G. McGowan, ...Geiger's Mills.
W. H. Stout, ...Pinegrove.
A. J. Kahler, ...Hughesville.
M. M. Naginey, ...Milroy.
H. M. Gooderham, ...Patton, R. F. D.
N. B. Critchfield, Secretary, ...Harrisburg.

ADVISORY COMMITTEE.

N. B. Critchfield, Secretary, ...Harrisburg.
A. J. Kahler, ...Hughesville.
H. G. McGowan, ...Geiger's Mills.
P. S. Fenstermaker, ...Allentown.

CONSULTING SPECIALISTS.

Botanist, ...Prof. W. A. Buckhout, ...State College.
Pomologist, ...Hon. Gabriel Hiester, ...Harrisburg.
Chemist, ...Dr. William Frear, ...State College.
Veterinarian, ...Dr. Leonard Pearson, ...Philadelphia.
Sanitarian, ...Dr. H. D. Moore, ...New Lexington.
Microscopist, ...Prof. C. B. Cochran, ...West Chester.
Entomologist, ...Prof. Franklin Menges, ...York.
Ornithologist, ...Prof. H. A. Surface, ...Harrisburg.
Meteorologist, ...Prof. Silas R. Eshleman, ...Harrisburg.
Mineralogist, ...Prof. Baird Halberstadt, ... Pottsville.
Apiarist, ...Prof. H. C. Klinger, ... Liverpool.
Geologists, ...Dr. Isaac A. Harvey, ... Lock Haven.
W. H. Stout, ...Pinegrove.
Forests and Forestry, ... Hon. Robert Conklin, ...Harrisburg.
Feeding Stuffs, ...Geo. G. Hutchison, ...Warrior's Mark.

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Hon. A. J. Kahler, ... Hughesville.
S. S. Blyholder, ... Neale.
Matthew Rodgers, ... Mexico.
E. B. Dorsett, ... Mansfield.

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A. P. Young, Chairman, ... Millville.

ROADS AND ROAD LAWS.

J. C. Weller, Chairman, ... Rockwood.

FRUIT AND FRUIT CULTURE.

D. A. Knappenburg, Chairman, ... Lake Carey.

DAIRY AND DAIRY PRODUCTS.

Dr. M. E. Conard, Chairman, ... Westgrove.

FERTILIZERS.

R. F. Schwarz, Chairman, ... Analomink.

WOOL AND TEXTILE FIBRES.

D. S. Taylor, ... Burgettstown.

LIVESTOCK.

M. P. Shoemaker, ... Greensburg.

POULTRY.

H. M. Gooderham, ... Patton.

PROCEEDINGS OF THE THIRTY-SECOND ANNUAL MEETING OF THE STATE BOARD OF AGRICULTURE, HELD IN CHESTNUT STREET HALL, HARRISBURG, PA., JANUARY 26 AND 27, 1909.

Harrisburg, Pa., Tuesday, January 26, 1909, 9 A. M.

Vice President George G. Hutchison in the Chair.

The CHAIRMAN: The hour has arrived to call the Board to order. Mr. Schwarz, the first Vice President not having arrived, that duty falls on me. We have met here for a great big "Farmers' Week." First, is the meeting of the State Board of Agriculture; this will be followed by a joint meeting of the Stock Breeders' Association and the Dairy Union. Now, we all want to join hands to make this the best meeting we have ever had.

I believe the first thing on the program is roll-call. Will the Secretary please call the roll?

Secretary Critchfield thereupon called the roll, in reply to which the following gentlemen answered to their names:

Members Ex-Officio: Dr. Edwin Earle Sparks, President of State College, and Hon. N. B. Critchfield, Secretary of Agriculture.

Appointed by the Governor: Gen. James A. Beaver, R. I. Young and R. H. Thomas, Jr.

Appointed by the State Poultry Association; J. D. Nevius.

Elected by County Agricultural Societies: A. I. Weidner, A. J. Purdy (successor to J. S. Burns), S. S. Blyholder, David W. Lee (taking the place of W. C. Lutz), H. G. McGowan, Howard Cox, Edwin Platt, N. F. Bartley, H. M. Gooderham, John A. Woodward, M. E. Conard, S. X. McClellan, E. M. Davis, J. A. Herr, A. P. Young, J. F. Seavy, E. J. Durnall (succeeding R. M. Heyburn), John F. Young, J. L. Patterson, Geo. G. Hutchison, S. M. McHenry, Peter Cowan, Matthew Rodgers, Horace Seamans, Samuel McCreary, H. F. Snavely, P. S. Fenstermaker, A. J. Kahler, M. M. Naginey, J. Sexton, C. S. Messinger (succeeding W. F. Beck), I. A. Eschbach, A. T. Holman, W. H. Stout, J. F. Boyer, John C. Weller, E. R. Warburton, E. B. Dorsett, J. Newton Glover, R. J. Weld, D. S. Taylor, Warren E. Perham, M. P. Shoemaker, D. A. Knuppenburg, and G. F. Barnes.

The following Specialists were also in attendance: Dr. Leonard Pearson, Veterinarian; Dr. George G. Groff, Sanitarian; Prof. H. A. Surface, Ornithologist and Entomologist; Prof. Franklin Menges, Entomologist; Dr. Isaac A. Harvey and W. H. Stout, Geologists; Dr. William Frear, Chemist; Prof. Baird Halberstadt, Mineralogist.

The SECRETARY: A quorum being present, the business of the meeting can now begin.

The CHAIRMAN: Those of you having been appointed or re-appointed, will please present your credentials to the Committee on Credentials, and if the same are found correct, you will be duly elected members of the Board.

The next thing on the program is the reading of the Minutes of the last meeting.

The Secretary thereupon read the Minutes of the last meeting of the Board, which took place at New Castle, Pa., May 26, 1908.

The CHAIRMAN: You have heard the reading of the Minutes; are there any corrections? If not, they will stand approved as read.

The CHAIRMAN: I will appoint the following Committee on Credentials: J. A. Herr, H. M. Gooderham, D. S. Taylor, M. P. Shoemaker and R. J. Weld. These gentlemen will receive the credentials of those who have not already handed them to the Secretary. Any one here having credentials from any agricultural organization will please hand them to this committee. I will repeat this announcement for the benefit of any who may have come in since I made the statement. If any one has come in with credentials, they will please hand them to the Committee on Credentials, of which Mr. J. A. Herr is Chairman.

Next in order is the reports of Specialists and Standing Committees. The Secretary will please announce these.

The SECRETARY: The first in order is the report of the Botanist. I would say that while Prof. Buckhout is not here, I have a letter from him in which he says that there is nothing new to report, nothing having developed from last year, so he will make no report.

The next in order is the report of the Pomologist, Dr. Funk. Is he here? Dr. Funk does not seem to be present, so we will have to go on to the next; but I don't see why the Chairman can't read these names as well as I can.

The CHAIRMAN: Of course, I will gladly do so, but I don't want to take anything from the honor of the Secretary. I presume Dr. Funk will be here later.

MR. FENSTERMAKER: He wrote me a letter, saying he would be here.

The CHAIRMAN: Next comes the report of the Committee on Fruit and Fruit Culture. Mr. Hall is not here, but I presume he will arrive later, and we can then take up his report. Next in order is the report of the Committee on Livestock, by Mr. I. A. Eschbach.

Mr. Eschbach was present, and read the following report:

REPORT OF THE COMMITTEE ON LIVESTOCK

By I. A. ESCHBACH, *Chairman.*

The Livestock industry of our Keystone State is one of paramount interest to the farmers. The horse, the cow, as well as all the other animals of smaller dimensions, contribute so much to our comfort, convenience, and financial success, that, were we deprived of all these friends, I fear the farmer would soon degenerate, possibly to a lower level than some of the more intelligent of the animals we have under our care.

During the past three months especially, many hearts of our good people of our section of the State have ached for the loss of some very valuable cattle that had become part of their very lives. Their business gone, as well as the cattle they had learned to love and provide for, and these people are at this very time very anxious to again embark, and replenish their herds with the very best they can find. I refer to the outbreak of the Apthous Fever or "Foot and Mouth Disease." And while we people northward, and adjoining counties cannot help but express our thanks to our worthy Secretary of Agriculture, and our efficient Livestock Sanitary Board for their prompt action in striking out and trying to rid the State of the dread plague, we feel, also, that it is almost time to let up, and have these people again doing business without such hide-bound restrictions. Much more might be said, but a hint in this direction may help to relieve matters for the benefit of our farmers and dairymen.

According to the report of 1906, we have in Pennsylvania
607,010 horses, valued at $66,127,689.
40,864 mules, valued at $5,024,210.
1,141,494 milch cows, valued at $41,093,784.
984,750 other cattle, valued at $17,479,308.
1,102,058 sheep, valued at $5,353,799.
989,885 swine, valued at $9,303,039.

It seems evident that this amount of cattle, especially, has increased since that time, owing to the growing demand for milk and cream in our larger towns and cities, and also the demand for good beef and pork as well. We feel justified, therefore, in advising the raising of more cattle in Pennsylvania, although in districts where mixed farming is practised, it becomes a question, very often, whether it is a success financially; but it is the opinion of your Committee still, that Pennsylvania farmers should raise more cattle. Can you place a value on a lot of the best bred milch cows—cows that give their owners a profit for every pound of feed fed into them? We therefore advocate the breeding to better sires, of whatever type you may select. It is the growing of the best of every kind of live stock that pays, and we would offer a word of caution along the line of the stockyard bull. One reason why the "Foot and Mouth Disease" got into so many herds in Pennsylvania in so short a time, was because it was carried by stockyard bulls. These are

bulls which dealers pick up in the stockyards and ship to dairy sections, where they are sold to dairymen, whose sole requirements are that the bull should be cheap and sure. Any bull, regardless of individuality, ancestry, or prospective posterity, is good enough if he is cheap enough and sure. A bunch of bulls from an infected pen at Buffalo, N. Y., was taken into Pennsylvania, and cost the State probably more than all the stock bulls ever sent from the stockyards were worth. Beware of the stockyard bull. One of them carried abortion into a large herd of fine cows, whose owner lost enough to pay for a dozen good bulls before he got rid of the trouble. Another bull took Pink-eye along with him, and his owner found he had cost several hundred dollars, and wasn't worth anything, either. Buy your bulls from breeders, whose herds are free from disease. They will cost a trifle more, but they will be worth infinitely more if any calves are to be raised, and we notice that a few calves are raised even from stockyard scrubs. Nowhere else is the Pennsylvania farmer so short-sighted as in the case of the sires he uses.

The same thing is true along all lines of stock-breeding. Better stock to breed from is the crying demand. We, as farmers and dairymen, cannot expect very much improvement in the quantity of milk produced, or butter, unless we make an honest effort to get better sires and mothers for the foundation to build upon. Farmers in Pennsylvania are giving much time to the production of milk, but comparatively little to the breeding of animals that will, in the future, produce the milk.

There are in Pennsylvania 224,248 farms, with an average of about 15 head of live stock upon each; but how many of these, especially milch cows, are raised on these farms? It is estimated that Pennsylvania imports about 15,000 dairy cows every year, mostly from New York and Ohio. These cost about $600,000, or an average of $40 per head. This State can raise as good cows as any other in the Union, and it will be a business of no small importance if properly carried out. In the last census year, 1900, 93,502 animals were imported and slaughtered for meat alone. Can Pennsylvania farmers not take a hand in this matter, and secure some of the dollars that go out to other states. It may be true that where mixed farming is in vogue, and on account of high priced lands, we had better buy than raise the beef animals, but it is also true that Pennsylvania has many districts that could raise more cattle, and be profitable, as well. Meat prices are advancing, and meats at this time may be very close to the 15c per pound average.

The raising of horses can be taken up with the same assurance of success. Almost all the heavy draught horses are now shipped into the State from the states further West, and big prices are paid for them. I just met a dealer who has been West and bought a carload of draught horses to fit up and sell, and he claims to have paid an average price of $230. Now, these horses, when fitted up, will sell next spring at almost fabulous prices in our eastern markets. Good Pennsylvania horses always command a price, and are really sought after, because acclimated, and by one making a business of breeding a good type of horse, either heavy draught or road horses, can feel sure of buyers. There seems to have been no great loss from disease or otherwise, in the State, during the year, but there is a steady demand for farm chunks and good-sized road horses, as

well as heavy draught horses. I had occasion just lately to price a registered Perchion mare colt at ten months old. The breeder asked the modest sum of $250, but I considered her a good specimen for foundation stock, and it is the best of all stock that I would advocate. The present stallion law has a tendency to encourage pure bred stock, and root out the scrub stallions. While we have many grade stallions that show good stock, when crossed on good mares, the tendency is to deteriorate. The horse for the Pennsylvania farmer to use, would seem to me to be a horse weighing from 1,100 to 1,300 pounds, showing good action, and able to make a respectable showing to the family carriage, for, be it understood, the Pennsylvania farmer of today shall not take a back seat in the procession. If we cannot have automobiles, we can have a good, stylish horse to our family carriage.

The raising of mules in Pennsylvania is another industry that might be profitable. Teams of mules are in demand, and prices are nearly always higher than for horses. $500 to $600 is not an unusual price for a good pair, but in the raising of horses or mules, breed good mares to the best type of stallion or jack that is available,—either for road or draught purposes. If a certain locality is breeding heavy draught horses, buyers will soon be looking after the available stock, and as buyers usually want draught horses in pairs, they can the more easily mate up pairs in such a locality. It would seem that breeding draught horses would be a source of profit on our farms, for two-year old colts can be made to do farm work, and thus earn their keeping, but first of all, we should have draught-bred mares to start with.

The hoof of the sheep is golden, and more sheep in Pennsylvania might aid in keeping down many patches of briars and weeds that only furnish harbors for worse rubbish to grow, and bad seeds to congregate. Sheep are profitable, and I can say that a small flock I keep, pays the largest per cent. interest of any crop on my farm, taking into account the labor and feed expended. They can live and thrive on pasture that other stock cannot survive on.

But this report would not be complete without taking into account the hog. The cheap meat, which comes from the carcass of a well-bred hog is furnishing the chief meat for the farmers' table; and, taking into consideration the amount of stock to be raised in a single season of these animals, it goes without saying that the hog products will always occupy a prominent place on the Pennsylvania farmers' tables, and the demand for these meats, both fresh and cured, means much in the shape of dollars every season. Prices are again on the advance, and the demand will cause farmers to raise and fatten all available stock. In this, as in all other stock-breeding, the use of pure bred sires is very marked in the offspring. A pure bred boar crossed on grade sows shows well in the make-up of the pigs and hogs to follow, and better still if both are well-bred. You may also be aware that different sections of the United States may require somewhat different breeds of hogs. For instance, in the Carolinas and other Southern States, a long-legged, razor backed type seems to be in demand. The farmer there says he must have that kind in order to out-run the darky, who wants meat, too; but with us Pennsylvania farmers any kind of hog that will mature early and at nine or ten months dress 200 or 250 pounds, is a good kind of stock to deal with. He is profitable, and can be

converted into meat at almost any age when needed. The farmer will find them a source of profit if properly handled, and the demand for country-cured hams, bacon, lard, etc., furnishes all the market necessary for the disposal of it.

I hope, in concluding this report, that I have at least made plain this one point—that is: the breeding of more and better livestock in Pennsylvania.

The CHAIRMAN: You have heard this report, gentlemen. What is your pleasure?

MR. NAGINEY: I move it be received and placed on file.

This motion was properly seconded, and carried in the usual way.

The CHAIRMAN: This completes the reports of this morning, unless some one has something to say. Are there any discussions on this report, while the Committee on Credentials is in session?

MR. FENSTERMAKER: I noticed a few words in Mr. Eschbach's excellent report in regard to the letting up of the quarantine restrictions on the Foot and Mouth Disease. It is becoming a hardship in our county, and the people are much opposed to the way it is conducted in many respects. People in whose vicinity the disease has not been for months are obliged to eight and ten months to drive a cow, and it looks as though some fellow was trying to hold down his job. Then, there seems to be a conflict between the State and National authorities. Then, there is another point: if this disease is as contagious as they claim, why don't they pay more attention to inspection than they have done. I have records in my pocket showing where herds have been slaughtered, where there was no inspection for four weeks afterward. On November 21st, the herd of John Schneck, of Schnecksville, was quarantined, and there was no inspection at all taken until December 16th—25 days thereafter. Then just to show you how things are conducted, Dr. Tolan and Dr. McBride, Federal authorities, came and killed all the pigs for fear they might take the disease, while cats and dogs and birds were round that offal all the time. The people have had trouble enough, and I think something should be done in this matter.

The SECRETARY: Before the discussion proceeds any further along this line, I would say that this matter will come up during Dr. Pearson's report. He will be here and make a report on many of the things we would like to hear discussed. I know that there has been a good deal of dissatisfaction, and I have no doubt but that there has been some want of harmony between the representatives of our State Livestock Sanitary Board and the representatives of the National government, yet, I believe, they are all trying to do the best they can. I think this matter will come up in the report of Dr. Pearson this afternoon, and we can talk it over at that time. The report of the Livestock Committee is an excellent one, and there are many sound things in it, but I would like to postpone this discussion until Dr. Pearson is here.

The CHAIRMAN: I think the suggestion of the Secretary is a very good one. The Doctor will be here this afternoon, and we can then go into the matter very fully. Suppose we take up the balance

of the report. Has any one anything to say about the condition of livestock in his section? Mr. Dorsett, have you anything to say?

MR. DORSETT: I have not; I came in late, and did not hear the report.

The CHAIRMAN: It was my duty to visit Tioga county last year, and I found a great disposition there to improve their stock—particularly the milch cows. They were putting in a milk condenser, and looking out to improve their livestock, and I believe they will do it. If any of you gentlemen are in that section, it will pay you to go and visit their plant, and see what the conditions are in that section of Pennsylvania, and also what it is doing for a better breed of cows. I predict that before long they will have a better breed of milk-producing animals than anywhere in Pennsylvania, and I attribute it to the milk condenser.

MR. DORSETT: We have just finished our Institutes up there last week, and the amount of interest manifested along the dairy line was surprising. There seems to be an intense interest, as you have said, along the dairy line. We have a large condenser at Wellsboro, and another at Mansfield; the Wellsboro plant has a capacity of 70,000 pounds of milk daily and the one at Mansfield, 50,000 pounds. That is a very large amount for one county. This is tending towards a larger milk supply, and the time is coming, as you said, when in order to get this, there will be a better breed of milch cows.

MR. RODGERS: May I ask the gentleman what breed of cows they use to produce this milk.

MR. STOUT: Allow me to suggest that we bring Mr. Dorsett up front here where we can all see him.

MR. DORSETT: In reply to the gentleman, I would say that at present there are many breeds, although the general tendency now seems to be towards the Holstein. I would say, however, that the method of buying this milk makes a little difference. At Wellsboro they buy it by the hundred, which tends towards the Holstein. In my own town of Mansfield, they buy it for the percentage of butter fat, and there the tendency is towards the Jersey or Guernsey. It makes a little difference.

The CHAIRMAN: Any further discussion? Any one who has anything to say is welcome to the floor, whether your credentials have come in, or not. We are having a little experience meeting until the Credential Committee reports.

MR. DORSETT: May I ask where this Committee is in session?

The CHAIRMAN: In the room right there in the rear.

MR. SNAVELY: Mr. Chairman, can't we take up some of the reports of the afternoon. We have only disposed of one matter on the morning program, and I fear it will crowd our afternoon program. I see Mr. McCreary here; can't we take up his report?

The CHAIRMAN: If that is your pleasure.

The SECRETARY: Will Mr. Snavely make a motion to that effect?

MR. SNAVELY: I make a motion that we take up some subjects on the afternoon program.

This motion was properly seconded, and regularly carried.

The CHAIRMAN: We will take up the report of the Committee on Roads and Road Laws, by Mr. Samuel McCreary, Chairman of the Committee.

REPORT OF THE COMMITTEE ON ROADS AND ROAD LAWS

By SAMUEL McCREARY, *Chairman.*

Gentlemen: I did not come here with any written report, and anything I may say will be just from my own mind. I have not prepared anything.

We had a good deal of experience in the present road law in our township, in Lawrence county, and our experience has not been as favorable as perhaps it should have been. We think our roads cost us too much for the use we got out of them, and, as far as our people are concerned, they will have nothing more to do with Macadam roads. They are a very expensive luxury. I look forward to the present Legislature to enact a law that will be more satisfactory, and give the people more benefit than they are getting from this present law.

There is one thing that I think is a mistake, and that is, that the State—I don't know whose fault it is—the State had spent quite a number of millions of dollars before they found out that the Macadam road is not the road for the people. It was too expensive, and I understand that they are not going to build any more of it. It does seem a very expensive piece of foolishness to spend over $7,000,000 and then find out that the roads are no good. We would like to hear from other counties. The roads that have been built in our township have cost about $9,000 a mile, and limestone is very convenient to some of the roads there. I must say that the first half mile built had not been built more than two years before it needed repairs to the amount of $700; that seemed too much money to pay, so it was not repaired, and is lying there yet, and it is a question whether it will ever be repaired. The people run over these roads with their autos, and soon grind the limestone into dust, and it does not last long.

The CHAIRMAN: Suppose you tell us what the foundation was, the depth of it, and what the layers were.

MR. McCREARY: The foundation was stone, and the layers were 10 inches. The first section was not stood up on edge, but was just kind of thrown in, then 4 inches of broken limestone was put on that, and then on the top of that about 2 inches of fine broken limestone—just about enough to round it off and smooth it. When

ever the wheels strike this fine limestone, they mash it up, and there are depressions right in the road where the wheels run, and where a single horse goes, and after a rain the water will run along these depressions and stay there.

The CHAIRMAN: Do they always drive in the centre of the road?

MR. McCREARY: They drive just where they please. The last piece of road was fully three and a half miles. The Court appointed constables, and they put up a notice that the people must drive to the right of the road all the time, but they can't always watch them. People drive where they please, and the automobiles go more than where they please.

The CHAIRMAN: Gentlemen, you have heard Mr. McCreary's report; the question is open to you, and it is an important one. I hope to see it fully discussed.

MR. McCREARY: If you will pardon me just one moment, there is one thing that I want to speak about. We have let three contracts in our township; I being one of the supervisors, know something about it, and we have never had but one bid on any one of the lot. These contractors are smart. They divide up the work, and I think it makes our roads cost nearly as much more as they should. It is not competition at all, but I don't know any way to overcome it.

The CHAIRMAN: I see the Committee on Credentials is ready to report. Shall we hear it now?

The SECRETARY: I think we might as well go on with this discussion, and take up the report of the Committee later. I think this would be a very good time for the State Board of Agriculture to formulate something that would be valuable to the Legislature. Our object in having these standing committees is that something definite may be brought out on the subjects to which they are assigned. We are all looking for something from the Legislature on the question of roads, and I doubt very much if there is any class of men more able to speak on this subject of roads than the representative farmers of the State, and I think it would be very helpful to the Legislature to formulate something giving them some definite idea of what the farmers of the State want. This is only a suggestion on my part; but that is why, from the very beginning of the Board, we have had these standing committees—to get something helpful on these subjects.

The CHAIRMAN: That is a very good suggestion on the part of the Secretary. I think we all feel that it would be well to give the Legislature some suggestions on this subject.

The SECRETARY: I think that possibly Mr. McCreary can add something to his report regarding this. Possibly it might be well to appoint a committee to formulate resolutions along this line. I think the Legislature has been working somewhat in the dark, and I believe it would be a good thing to get something into tangible form that would be helpful to the Legislature.

MR. SNAVELY: It seems to me that we can't do better this morning than have a free discussion on the road question. We have representatives here from most of the counties in the State, and in most of them roads have been built, and the members of the Board may be able to throw out some excellent suggestions. I, for one, am in favor of a full and free discussion. Let us talk over the matter, and see what we can get out of it.

MR STOUT: I want to speak of a little experience in our township in building about 3-5 of a mile of State road. They followed the same methods there that they have been followiug elsewhere, and the limestone is not a very satisfactory top dressing. The horses pick it out, and it leaves the road in a rough condition. That little piece of road cost somewhere between $8,000 and $9,000, and it costs something like $600 to keep it in repair. If all the roads in our county were built along the same lines, the expense would be greater than the people could afford to pay. But they are building other roads in our county; the farmers are building some of them, and we are satisfied with these roads, because we can dictate how they shall be built. The people should have the say, and the township give 1-8 and the county 1-8, and the State the rest; this it could raise through a county tax, and the corporation taxes, and a tax on the automobiles.

MR. HERR: Before discussing this important question, I think it would be well to find out who our members are.

The CHAIRMAN: We will now have the report of the Committee on Credentials.

MR. HERR, as Chairman of the Credential Committee, thereupon made the following report:

REPORT OF THE COMMITTEE ON CREDENTIALS.

The Committee on Credentials have examined the credentials of the following persons, and find them correct, and in proper form.

To be elected for three years from January, 1909:
A. P. Young, Columbia county, Millville, Pa.
Matthew Rodgers, Juniata county, Mexico, Pa.
Geo. G. Hutchison, Huntingdon county, Warriors' Mark, Pa.
P. S. Fenstermaker, Lehigh county, Allentown, Pa.
A. J. Kahler, Lycoming county, Hughesville, Pa.
David W. Lee, Bedford county, Bedford, Pa.
John A. Woodward, Centre county, Howard, Pa.
E. R. Warburton, Sullivan county, Campbellville, Pa.
A. J. Purdy, Allegheny county, Imperial R. F. D. No. 1, Pa.
Aaron I. Weidner, Adams county, Arendtsville, Pa.
C. S. Messinger, Northampton county, Tatamy, Pa.

For two years, to fill the unexpired term of R. M. Heyburn:
E. J. Durnall, Delaware county, Swarthmore, Pa.

MR. HERR: I move that these gentlemen now be accepted as members of the Board.

MR. WELD: I second the motion.

This motion was carried in the regular way.

MR. HERR: In the report of the nominations by the Governor, we find that the following gentlemen have been nominated as members of the State Board, for three years from the dates set opposite their names, respectively:

R. H. Thomas, Jr., ...Mechanicsburg, ... 1909.
James A. Beaver, ... Bellefonte, ... 1907.
R. J. Young, ...Middletown, ... 1908.

MR. HERR: I move that these gentlemen be admitted to membership in the Board.

MR. TAYLOR: I second that motion.

This motion was regularly carried.

The following delegates are also present:

George R. Hartman, Biglersville, Adams county; representing the Adams County Agricultural Society.

Clark G. Long,
Edward Shuey,
Peter R. Boltz,
Joseph T. Brubaker,
E. S. Risser,
M. H. Snavely,
George H. Bender,
John H. Bemitch,
S. P. Heilman, M. D.

} Delegates from the Lebanon County Agricultural and Horticultural Society.

Mr. G. B. Brown, of Pinegrove was present, representing the Farmers' Club of Schuylkill County.

Hon. Wm. T. Creasy, Master of the State Grange appointed the following gentlemen as delegates to represent the State Grange:

Hon. Geo. W. Oster, Bedford county.
Hon. J. T. Ailman, Juniata county.

Chester county sent the following delegates:

Peter D. Perches,
William P. Keim,
John H. Haldeman,
N. F. Dotterer.

MR. HERR: I move that these gentlemen be given the privileges of the floor, as delegates.

The SECRETARY: I second that motion.

This motion was carried in the regular way.

MR. HERR: These are all the credentials that have so far been presented to the Committee, and this report is signed by the following members of the Committee:

J. A. HERR,
M. H. GOODERHAM,
D. S. TAYLOR,
M. P. SHOEMAKER,
R. J. WELD.

The CHAIRMAN: Any one coming in with credentials will please hand them to Mr. Herr, the Chairman of the Committee on Credentials.

We will now resume our discussion of the road question.

MR. FENSTERMAKER: I happened to pass over a piece of road built less than four years ago; there is a 6-inch Telford, a 3-inch Macadam, and probably 1-inch of fine surface on the top. For the Telford they used the stone found in the fence corners, and for the Macadam, they used the Birdsboro trap-rock, or whatever they call it, and it was top dressed with Birdsboro rock. It was rolled down, and sprinkled and rolled again. In addition, they had a little over $4,000, to put a binding on the top; they used limestone; but just as soon as the autos went over it, it was done for. The bottom stones are now out in a great many places. It is an easy matter to criticise, gentlemen, but it is not so easy to remedy the matter. We have a great deal of heavy traffic in my section, and a great many autos, and the only way to settle the matter is to put on a permanent road. Cement is becoming so cheap that it can be used without any more cost than is incurred in building any other road. Cement will become very cheap. They find they can make it very cheap in all the states of the Union. We thought, in my section, that we were specially favored by Providence, but we find that that was a mistake, and it will take a long time for the consumption to catch up with the production in Lehigh county. The cement road has been tried in our section, and it has given most excellent satisfaction, and, in the long run, it is not more expensive than the other roads we are building.

MR. HERR: What is the subject under discussion?

The CHAIRMAN: It was decided to take up the afternoon program, and we are now discussing roads and road laws.

MRS. ANNA CADWALADER BETTS: I would like to ask the gentleman just one question—if it makes any difference as to what kind of soil it is put on. In the neighborhood I come from it will not stand the winter. They say it will stand the changes, but it will not do so in my neighborhood.

MR. FENSTERMAKER: I am not an expert on the question, but I think that is due to imperfect construction more than to anything else. There is a great deal of this work done in my section—sidewalks, cellars, whole houses even, and no trouble of that kind is reported. It is all in the construction. Of course, you must have a good foundation, and go down below the freezing line; then I don't think there will be much trouble.

MRS. ANNA CADWALADER BETTS: They have gone down below the freezing line, and there is still something wrong with it.

MR. FENSTERMAKER: It must be due to faulty construction. Perhaps the mixture was faulty, or it was not put down right.

MR. TAYLOR: Do you leave any cracks for the moisture to drain through?

MR. FENSTERMAKER: No; it is all solid.

MR. TAYLOR: They make it in my section, and the cement experts claim that by leaving these cracks, it makes it more durable.

MR. FENSTERMAKER: Now, take a concrete street; it is all solid.

MR. GOODERHAM: I would like to ask Mr. Fenstermaker what the cost of the concrete is over brick and asphalt.

MR. FENSTERMAKER: I can't tell you the exact cost of the concrete, but as near as I can get at it, it is about half the cost of the asphalt.

MR. TAYLOR: Over in Washington county in some of the towns they have some what we call "permanent road." We have been using two systems, one under the act known as the "Flinn Road Law," under the management of the County Commissioners. We have put down a number of miles of this road, but it has not proved very successful in the way of wear. I traveled over this road last year with the institute workers, over a piece that had been in use about three years. It is beginning to wear very hard, and whenever they get any water on the road it settles there, and gets very soft. These beds are made of limestone throughout. This is under the management of our County Commissioners, and has cost between $12,000 and $14,000 a mile for a 9ft. road. Then, we have two pieces under another act, called the Sproul Act, I believe. This is built partly by the State, partly by the county, and partly by the township. This is a better road than the one built by our County Commissioners, but, as has been said by the gentleman across the way, a horse will kick out a little piece of rock, and it will become loose, and the water will follow down and make the road soft. Then, we have another little experience in our township, where, instead of putting on the rock, they are putting on a hard brick, which is better than anything we have had yet. This hard brick is manufactured in our neighboring State of West Virginia. We can get it comparatively cheap, and it has given excellent satisfaction so far as we are concerned.

MR. SNAVELY: What is the cost of the hard brick?

MR. TAYLOR: I don't know, but I don't think it will exceed the cost of the limestone road. At Burgettstown they had a road, but the council was divided between a stone and a brick, and they put down the stone a year ago, but the soft finish has worked up into a mud, and they will have to do something before another year.

MR. FENSTERMAKER: What is your base?

MR. TAYLOR: Crushed limestone.

MR. SNAVELY: How deep?

MR. TAYLOR: About 9 inches.

MR. SNAVELY: What is the size of the brick you use?

MR. TAYLOR: About 2½ x 3 inches—the same as our common brick.

A Member: What do they cost you per thousand?

MR. TAYLOR: I can't tell you that.

MR. SNAVELY: I wrote to Ohio in reference to a brick road, and the resident engineer tells me that they built a road from brick 36 feet wide for $9,000. That does not include bridges or culverts.

MRS. ANNA CADWALADER BETTS: From an economical standpoint, I would like to ask about the cost of keeping these roads in repair. I am a taxpayer. and would like to know the cost of repairing these concrete roads.

MR. FENSTERMAKER: I can't tell you that, because it is an experiment that has been going on for a year and a half. But, understand that we have a curbing on each side of the street, and no water can get down there at all. Whether this will apply to country roads, I can't say.

MR. McCLELLAN: We don't have a brick road in Clearfield; but I was up to Venango and to Franklin, where they have them. It has cost them about $8,000 a mile. A piece of that road got almost impassible, and they made a temporary bottom and laid brick where there were some thirty or forty springs of water coming out a little valley, and they just set these brick up on edge some seven or eight years ago, and they never had any expense for repairs until they built a new road last year. It seems to me that the brick road will be the economical road for the taxpayer.

MR. DAVIS: But won't the brick become a dangerous thing where there is a steep grade? I think it will be a bad thing for our horses up in the country if we get them.

The CHAIRMAN: Brother Davis brings up a point that it will be necessary to consider in the use of the brick road.

MR. SNAVELY: I just want to give you these figures; the gentleman said this road was built of brick, 36 ft. wide, with a standard grade of brick at a cost of $9,800, and the length was 5,750 ft. This was simply for the construction of the road, and did not include culverts or bridges.

The CHAIRMAN: Now. I am sorry that Mr. Hunter is not here; he is a fair-minded man, and could give us some points.

MR. FENSTERMAKER: He will be here this afternoon.

MR. HERR: I then arise to a point of order. This program has been sent all over the country. This subject was taken up out of order. The Road Commissioner is not here; he probably would be here if the subject was taken up at the proper time. I would ask whether there are any other committees that have arrived so that we may take up their subjects and postpone this discussion until this afternoon, when the Road Commissioner is here.

MR. SEXTON: This road question, as Brother Herr says, is one of our most important questions, and it seems to me that it should be discussed when all are on hand to hear the discussion, and I have no doubt but that the Highway Commissioner would be only too glad to come to our meeting and discuss this question, and answer

any questions that you might choose to ask. I know he is a very fair-minded man, and it seems to me that it would be a good thing to wait a little until he can be here with us.

The CHAIRMAN: Now, if it is your pleasure, I will invite Mr. Hunter down here this afternoon, and we will thresh this out, and show him the conditions that exist throughout the State. We don't want to have any controversy with him—only a fair discussion, and if it is your pleasure, we will let the discussion go over until he can get here this afternoon.

MR. HERR: I move that the discussion be postponed until this afternoon.

MR. SEXTON: I second that motion.

The motion was carried in the regular way.

The CHAIRMAN: Has Dr. Funk come in, or do you know anything of him? Since it appears not, has Dr. Groff come in? Not here. Prof. Klinger, is he present? No. Mr. Black, of Mercer; has he arrived? He does not seem to be here either. But I see we have our former Secretary of Agriculture with us, and we shall be pleased to hear a word from him. I will now call on him.

MR. HERR: Just a moment: I have no official notification, but I see that the Senior Member of the Board, Mr. Charles H. Mullin, recently died at Ht. Holly Springs. Mr. Mullin is the oldest member of the Board, having been admitted in 1878, and was consecutively a member ever since. He has not been in active service recently, but I think it would be wise to take proper notice of his death.

The CHAIRMAN: Do you make that as a motion?

MR. HERR: Yes.

This motion was properly seconded, and regularly carried.

The CHAIRMAN: I will appoint a committee to take action on the death of Brother Mullin later.

I have now the pleasure of bringing before you Professor Hamilton.

ADDRESS OF PROFESSOR JOHN HAMILTON.

It is not necessary for me to say, gentlemen, that it is always a pleasure to me to come to Harrisburg and meet the men who have done so much for me personally. I always look back upon the members of the old State Board as my staunch friends. They have been true, not only to me, but what is of far greater consequence, they have been true to their trust as representatives of the Agriculture of Pennsylvania.

A number of years ago it was said that there was nothing more for you to do for agriculture in Pennsylvania. The progress you have made since then completely refutes that. There never was

more for this State Board to do than there is today, and if your ability to do were five times greater than it is, there would still be sufficient to occupy all of your powers. The work that you have done heretofore has gone on so quietly that many people have not appreciated it. You have been laying the foundations on which the great work in agricultural improvement now going on is based. You, as a board of agriculture, have laid a good foundation, and now that the time has come to put on the brick and mortar and erect the building, the quality of your work begins to appear. It has been of the most valuable and solid kind.

Let us stop a moment and look at some of the things that lie before you. Most of us older men like to live in reminiscence; to think of the things that we have done; to feel how much the world is indebted to us. I believe that our motto should be that of the great Apostle: "forgetting the things that are behind, I press forward." That should be the watchword of this Board—"we press on." Although some of you are getting along in years, you are nevertheless still of one heart and one mind to press forward.

The great work that lies before you is this: To show the men and women in all of our communities how to make a living on the land. That is what we are trying to do. The work of education in the country, and all of the machinery in operation for rural betterment has for its chief aim,—to teach the men and women of the country how to make a better living; how to make more money out of the land; to have better homes; how to get ahead in life. To teach a man who is ambitious to own a farm, but with very little money, how to cultivate a piece of land so that in twenty years he shall own it, have it paid for, together with its stock and equipment, with sufficient surplus to enable him to give his children an education, and assist them to make a start in life; to take a young man, who has as his capital only good health and a fair amount of energy, and teach him how to succeed, is doing valuable service to the State. The time will come very soon, it is coming now, when a large number of the people in our cities are going to get out into the country districts, and then the problem will be how these people are to get started so as to make a success of agriculture, and secure a living.

The next problem is to so start our children, who are to succeed us, that they may begin where we leave off, and to successfully pursue farming as a profession. The solution of this problem is not easy. Fortunately a great many of our most competent men are giving the question their serious attention. Last year in discussing the question of "A Better Agriculture" I called your attention to the crop returns of the United States. We grow corn, about twenty-eight bushels to the acre; wheat, 13.5, and other crops in similar low averages. If we do our duty we will have to show people how to grow 25 to 30 bushels of wheat to the acre instead of 13.5, and 100 bushels of corn instead of 28.

I have just come from Nebraska where I attended a great agricultural meeting of farmers from all over that State. In an interview with the Director of their Experiment Station, the question of the value of methods in use in dry farming was raised, when the director asked his assistant to read me the result of some of their experiments out in the Western part of the State, on the semi-arid lands, where the rainfall is only 12 inches in a year. He showed

how by plowing for wheat at a certain time, using the ordinary methods, they got about twenty bushels to the acre. By another method they got 27 bushels to the acre, and by still another they got 59 bushels to the acre. It is certainly worth knowing how to increase the yield from 20 bushels to the acre to 59. We are coming to a time when we will have to show the people how to raise these large crops with certainty each year, notwithstanding varying climatic conditions and varieties of soil involved. If it can be done out on the arid lands, what should we be able to do on our mellow, cultivated lands here in this State?

These important results are coming to us through investigations, carefully conducted, and data accurately kept by men who are trained to test and to discover. I would like you to estimate what that Experiment Station is worth to the State of Nebraska that shows how in that Western country they can grow, instead of 20 bushels, 59 or 60 bushels of wheat to the acre, as the result of their investigations. There is no investment that promises as good returns to the people out there as money expended in this investigation work. We have an experiment station of our own, and a State college, which has recently taken on new life. Those of you who stood by these institutions when many sneered, are now seeing the results of your loyalty, and your sons and your daughters who are going to be educated there are going to do more for the agriculture of Pennsylvania than has ever before been done. We have an institution up there which has not its duplicate anywhere else in the world—the Institute of Animal Nutrition, where they measure the true value of feed, and know what becomes of it in the animal economy. In order that that Institute may do proper work, it will need $100,000 a year. It needs that now, and will need a great deal more after awhile. You want to know why it needs such a large amount of money? A very simple statement is all that is required to show this. The apparatus for determining the value of food is a large box into which an animal is put, where it is fed and watered upon substances whose composition is definitely known. Accurate records are made about every half minute, possibly every few seconds, of what is taking place in there. In the course of a few days an amount of data will have been secured that will take several men several weeks to work out, and discover what the experiment teaches. While this computation is going on another force of men should start another series of experiments, and then another crew of experts while these data are being worked out in turn. This apparatus cost over $10,000 to install. In order to utilize it to the best advantage and enable it to produce the best results, it needs to be worked all the time. Who of you would run a flouring mill three days, then stop for two months, and then start it up again for three days, and so on? It would not be likely to prove a very profitable enterprise. That it may be kept going continually is the first reason why the institute of animal nutrition needs a large amount of money. The second is that the men in charge of it must be experts, and men whose word can never be questioned. They must be capable, honest, and truthful, on whose word you can spend ten or fifteen or twenty thousand dollars, and know that it is safely invested. Such men are expensive. Their services are in demand in other States and to secure them and retain them suitable salaries must be paid.

There is another phase of the agricultural education question that has recently become prominent in this country and that will need your aid and best skill to properly develop. The estimated number of children in Pennsylvania between the years of 5 and 18 in 1907 was 1,865,832. Fully 20 per cent. of these are in the rural districts amounting to 373,166. They all need education. A large pro portion need agricultural education and many others need this same thing who are in the towns and cities of the State. Several hundred thousand would be greatly benefitted if they could take an agricultural college course. They need this course in the new education as an investment with which to start out in life. They can't all go to college. Then what? If they can not come to the college, we must take the information out to them. The time is coming when this college instruction in agriculture will be carried right out to the young people in their own commnnities; this movement has already started in some states, and Mr. Martin, your State Director, has started it here—the movable school of agriculture. I hope you will give him your most cordial support. He will make mistakes; we all make mistakes, but if we profit by them, after awhile the thing we want will be worked out, and the time we are looking for, and hoping for, will come. Possibly not in our day, but the time will come when all of our sons and daughters who enter the ordinary country schools will get instruction in agriculture there, and later will receive additional training in this science in the high school and in the movable school that will come to their very doors. Some of us will not see it except by faith. We know that it must come. We know that country people need instruction of this special kind, and we know, too, that when the need exists it will eventually be supplied. The time is coming also and it is not very far away, when we will send experts out over the country to teach men how to grow forty or fifty bushels of wheat to the acre, and instead of twenty-eight bushels of corn, they will show them how to grow sixty, seventy, eighty, ninety, and a hundred bushels to the acre. The primary requisite in accomplishing any thing is to know how. It is only then that we obtain results. You started more than thirty years ago to teach agricultural people how to increase their crops. I wish you could live for a thousand years to come, for you are just beginning to understand your work. This long life is denied us here, but you will no doubt look down from the other side, and see many of the things you have hoped and worked for consummated by those who follow you, who will take up and carry on your work.

The CHAIRMAN: I will appoint the following gentlemen as the Committee on Resolutions on the death of Hon. Chas. H. Mullin, late member from Cumberland County: Mr. J. A. Herr, Mr. A. P. Young, Mr. McHenry, Mr. Stout, Mr. Naginey.

Is there anything further before adjournment? Has the Secretary anything to say?

The SECRETARY: Nothing.

The CHAIRMAN: Anything about heat or light? We are doing the best we can, and trust no one is suffering any inconvenience. It will no doubt be a little more comfortable after awhile.

MR. KAHLER: I would like the Legislative Committee of the State Board of Agriculture to meet at the Bolton House about five o'clock.

MR. CLARK: I wish to state that the Allied Agricultural Associations had a meeting this morning and adjourned to meet this evening at seven o'clock at the Secretary's office.

The CHAIRMAN: You have all heard these announcements; the Legislative Committee is to meet at the Bolton House at five o'clock, and the Allied Agricultural Associations will hold an adjourned meeting in the Secretary's office at seven o'clock.

MR. HAMILTON: I just wish to make an announcement; I was at that meeting; they adjourned in order to take in as much of the session of the State Board as possible, and listen to the discussions here.

MR. BLYHOLDER: As a member of the Legislative Committee, I would ask that all members having resolutions to present to that committee should present them this afternoon, in order that we may consider them at our meeting.

The CHAIRMAN: Any further business to come before the Board? If not, a motion to adjourn to meet again according to the program, would be in order.

MR. STOUT: I think it is just about train time for the Reading people to arrive; isn't there another report to be read?

MR. HERR: I move we adjourn to meet again at 1.30 this afternoon.

This motion was properly seconded, and regularly carried, and the Board adjourned.

Tuesday, January 26, 1909, 1.30 P. M.

Mr. Blyholder in the Chair.

The CHAIRMAN: We are now ready to proceed with the program of this afternoon; is Dr. Pearson, the Veterinarian, present?

SECRETARY CRITCHFIELD: I saw him a few minutes ago; he said he would be in.

The CHAIRMAN: Well, I hope he will. While he is not present, we will have the report of the Apiarist. Is Mr. Klinger present? He does not appear to be here. Next comes the Sanitarian, Dr. Groff; is he here? He does not appear to be present, either.

The SECRETARY: I had a letter from Dr. Groff, saying he would be present during the afternoon, and read his report.

The CHAIRMAN: Next comes the report of the Committee on Roads and Road Laws.

The SECRETARY: That was read this morning, but the discussion of it was postponed until this afternoon in the hope that Mr. Hunter would be present with us. I understand he is to be here

about two o'clock, and we will postpone the discussion until that time. In the meantime, we can take up the next subject—the report of the Committee on Wool and Textile Fibres. Is Mr. Black present?

MR. FENSTERMAKER: Mr. Chairman, quite a number of the members are in the other room. I would send a committee over to get them.

The CHAIRMAN: Naturally the discussions of the foregoing reports are very short, since we don't have any reports. I suppose we will have to take up the next subject. Is Dr. Gay present?

MR. GLOVER: Dr. Gay is out in the other room at work.

The CHAIRMAN: Is the next speaker, Dr. William Hill, present? He does not appear to be present; that brings us to the end of the program of the afternoon.

A Member: A motion to adjourn would then be in order.

The SECRETARY: Just a word of explanation; before the name of any one is placed on the program, he is consulted, and no man is placed on the program without his consent. After his consent has been obtained, he should be here to answer to his name. I make this statement in order that the Secretary may be relieved of the blame of having placed any one on the program without first notifying him, and obtaining his consent.

The CHAIRMAN: And another thing that it is well to impress on the members; that is, when the program says 1.30, it does not mean three o'clock.

MR. FENSTERMAKER: Why not continue the discussion of this road problem? During the noon hour I met Mr. Messinger, Mr. Beck's successor, and he tells me that the concrete road is just the thing. They have a sample road in Northampton county. Why not let him tell us about it?

The CHAIRMAN: We have postponed the discussion until two o'clock, because Mr. Hunter is to be with us at that time.

The SECRETARY: I move we take a recess until two o'clock; it is just about eighteen minutes of two now.

This motion was properly seconded, and regularly carried, and a recess was taken until two o'clock.

The CHAIRMAN: We will now take up the program again. The first report is that of the Veterinarian, Dr. Pearson. Is Dr. Pearson present? The next, is the report of the Apiarist. Is Mr. Klinger present? No reply from either of them. Is the Sanitarian, Dr. Groff, present? No reply. Now, we come to the discussion of the road problem. I understand that the report was read this morning, but the discussion postponed until Mr. Hunter comes this afternoon. Is Mr. Hunter here?

MR. SNAVELY: I understand he is in the other room.

The CHAIRMAN: We will take up the next subject—"Pedigree Registration," by Dr. Carl W. Gay. Is Dr. Gay here?

Dr. Gay was present, and made the following address:

PEDIGREE REGISTRATION.

By DR. CARL W. GAY, *Philadelphia*.

The best example of what I want to talk to you about this afternoon, is shown by a certain breed of fat hogs, which are called by the packers "A1 Barrows." In one case I know of they were fattened by one of the best breeders in the country, and they were part of a herd where they were not used as boars. In other words, they were part of a herd where pure bred boars were not used. They were Berkshires, but they were bred by a man who never kept any records of his hogs. He knew they were pure bred Berkshires because he had never kept anything else, but he could not prove their breeding, and that is why they were barrows. The best hog grown by that man would not meet the market requirements of pure bred, because no records have been kept.

I can match this with an illustration from my own experience. Some time ago we wanted a pair of Percherons for class work, and searched over the State for them. We finally came to a place in Ohio where we found a pair of very superior fillies, better than anything we had ever seen. We were pleased in looking over these fillies, and then made inquiry "of course their papers are all straight?" He said, "Well, I know they are pure bred; my mares are all pure bred, and I have never used anything but pure bred horses, but I have no records of them." It cost that man the difference between $600, which would have been a fair price had they been registered, and the ordinary market value of $225. Now, we can talk about the advantages of our pure bred livestock, and that is all very well, but it has cost many a man hundreds, even thousands of dollars, by belonging to that class of breeders who have not kept up their records, and it is this neglect, and this apparent indifference that has led to the matter we are discussing today.

The question naturally arises, "What is the real importance of a paper?" A pedigree is nothing more or less than a record of ancestry. But what do I care about ancestry? I am going ahead, not back. But here is the point; your ancestry reflects your progeny. You have a bull you want to use; he stands between his ancestry and his progeny that come from him. He is like the sand in the two sections of the hour-glass. Everything in that glass concentrates in the constricted neck; so all the forces of that ancestry concentrate in that one animal. All the traits manifested by those ancestors are shown in this animal, and this animal will be repeated in his progeny, and, of course, it is in the progeny that we are most concerned. Ample reason, this, why this pedigree registration is of the utmost importance.

Now, there are two kinds of paper, unofficial and official. An unofficial record simply has the value of a memorandum. I don't believe that you can know what I do in regard to this one thing, but our experience this past year has shown us very clearly the indifference or inaccuracy of the horsemen in this respect. The law requires that they send us a pedigree certificate, and it would surprise you

to see the things they send us. They will tear down an old bill, which they have had struck off, advertising the animal, or something of that sort, and send it in to us as a pedigree certificate. Now, what value can a certificate of that kind have in registering an animal? It may answer as a memorandum, but there is nothing of the certificate about it. They are merely individual pedigrees that serve for the purpose of keeping in that man's mind the pedigree of the animal. But the official pedigree means something else; it means being vouched for by some one else, and has an official recognition, the result of an official organization. Now, in states where breeding has attained any standing whatever, they have organized associations, who regulate these things. Take for instance the Herefords. We all know that they have certain characteristics which distinguish them from any other breed, and any bearing these characteristics is naturally stamped as a Hereford. If you have been breeding a certain strain for thirty or forty years, and get a case of reversion so that the animal does not come up to the standard of the Breeders' Association, out he goes; if, on the other hand, you have one that may not be so nearly pure, and he comes up to the standard set by the Breeders' Association, he goes through.

Now, this official certificate has another important bearing. Every authorized Breeders' Association keeps a record of all the births, breeding, progeny and death of a given individual. They make it their business to know when an animal comes into life, keep track of him during life, keep track of his progeny, and finally chronicle his demise. These authorized Associations are recognized by the United States Department of Agriculture; that is what makes them official, and we don't need to go any further back in the matter. They have specified certain requirements to which every Association must conform in order to get their sanction to conduct these registrations. Just to show you how this works—several years ago one of the Percheron Associations—unfortunately there are three—was giving a pure bred certificate to the progeny of pure bred Percheron sires and French Draught dams. The other two Associations did not do this, and the United States Department of Agriculture on learning this immediately notified this Association to change their ruling, or else lose their right to register horses. Of course, they rescinded. It gave us a good deal of trouble last year, because we were getting these pedigrees in, and had a lot of them until the United States Department of Agriculture issued this order, so that we have a record of pedigree, that may be called unofficial and official. It becomes official when it has the stamp of the Government on it.

Now, the advantages of these pedigrees are that it gives you the traits of any particular strain. If you are buying a dairy cow, you want a record of her sires and dams; you want to know what they have been doing; in some of them you will find a prepotency that you want carried along in your progeny, and when this prepotency exists for several generations along one particular breed, the chances are just so much more in her favor. It is the same thing in horses. If you want speed, you look for the records of a sire that has a record along the line of his ancestry of 2.10, or better, or anything you want to make it. It is the character of the individual that gives the pedigree its value.

Another very essential thing in connection with the record of the individual, is the completeness of it. Of course, any record is more valuable as it is more complete. Now, take an animal whose records you have for six generations back—sixty-four individuals. You can trace that back and get a record of every one of the sixty-four individuals, and the farther back that record goes, the better. The objection to the incomplete record is that it endorses an unknown quantity. The farther back this unknown quantity extends, the better it is; still, there is the chance of a case of reversion to the undesirable, and the closer this ancestry is, the greater this danger. The most important thing in connection with these records is reliability. It qualifies every other thing. If the pedigree is not reliable, you can't depend on it. Now, your means for determining the reliability of these certificates is the work of the Association. When you buy a horse you do not get proper satisfaction until you get a pedigree certificate, together with a transfer certificate. You want a clear title. You don't simply want to know that he has the advantage of being pure bred, but you want to be able to prove it, and you go to the records to see that it is clear all the way back. It is exactly the same thing as buying a piece of real estate. You not only want the deed to it, but you go to the records to see that the title is clear all the way back. So with the pedigree certificate. You do not get a clear title until you get a certificate attested with the sign and seal of the Association in which he is registered and this association is authorized by the government. Many men buy cattle that are not reliably pedigreed, and find it out to their sorrow when it is too late.

There are three kinds of unreliable certificates that are worked off on the unsuspecting buyer, if he is not careful to see that the horse is properly registered in an Association duly authorized. The first of these is an out and out counterfeit. I don't mean by this that the majority of dealers are dishonest men to that extent, but I know of a man who was buying in France, and the dealer said to him, "If you take such and such a horse, I will give you two pedigrees." My friend said "What would I do with two pedigrees?" The dealer smiled and said "Use them. I sold one horse with which I gave seventy pedigrees." Again, a man is a good dealer, and he has a perfectly straight pedigree, but his horse dies, and he knows there is a horse in his neighborhood which just about fits the description in the pedigree, so he goes and gets that horse, and uses this pedigree on him, which does not in the least belong to him. I have known one case where a horse was gelded at three years old, and a horse nine years old is using his pedigree today. The third, and most frequent form, is that of the certificate of the unauthorized association. There are a number of these Associations today that are not authorized, and they issue the certificate a little cheaper than the authorized Association, so a good many men think it is just as well, and a little cheaper, to have their horses registered there. Now, there is a man in this audience who showed me a beautiful breed of mares. I asked him about the pedigree, and he said "Oh, yes," and showed me one of these unofficial certificates. The bogus certificate is usually more flashy than the authorized one; it has more gold on it, and makes it look dashier. I recognized the fact that this Association had no standing, but didn't want to tell him so, so told him he had better write to the Department, and he

was advised that he had paid a full bred price for grade mares. It happened that those mares were eligible to registration in an authorized Association, but not every man is so fortunate.

The only way to correct things of this kind is to get your horses registered in an Association that is recognized by the United States Department of Agriculture, and secure from it a certificate bearing its seal, and signed by its officers. Then there can be no question of its reliability.

Now, as to what constitutes pure breeding. That has become largely a question settled by the Association to which it belongs. Take the Percheron Association; they require certain things, and the animal must fulfill these requirements before he is considered pure bred. The French Draught Association does not require so much. They take four top covers; or, take our Standard bred horses. A horse may become Standard and registered without any breeding whatever, simply by fulfilling the requirements of a pure bred horse as to type and class. Then a horse can get into the Morgan Registry better than he can into the Standard, even. They have taken them in at 1-64th—generations removed from old Justin. You take Red Cloud, of Kentucky; he is registered in the Morgan Saddle Horse Association, and every filly this horse ever foaled is eligible to registry in the Association. So it seems to follow that it is not so much whether a horse is really pure bred as whether he conforms to the standard of the Association that constitutes pure breeding, and makes him eligible to a pure bred certificate.

Now, the conclusion that I want to draw from this discussion is simply this: That most of these men who are dilatory and neglectful in keeping up these records are so from carelessness more than anything else. The average farmers' hand seems to fit the plow handle and the corn knife better than the pen; he hates to write, and so puts it off; or perhaps he has been working hard in the field all day, and is tired when night comes, and so puts it off until he has more time; he knows his stock by their ear marks, and that is all that is necessary for him until he comes to sell; then he must be able to give a clear title if he wants to get any price, or if he is buying, he wants to know what is behind the animal he is buying, so that he may know what effect it will have on his stock. This is what makes pedigree registration important. Only by proper registration can a man hope to realize on his stock what it is worth, and that is worth the time and labor spent on keeping these records. I thank you.

The CHAIRMAN: Now, gentlemen, we will take up the discussion of the road question where it left off. If Mr. Hunter is in the room, I wish he would come up front where he can hear the discussion. The question open to you is roads, road laws, and road-making. Mr. Hunter is present; he is a good listener, and he will be able to give you some information; so let us have a full and free discussion, and bring out some points that will be of interest to all of us.

MR. LEE: As the gentleman who had the subject in charge, said this morning, the road laws are not, I think, what we need. Most of them are old, and I think there are several reasons why we should try to improve them. In the first place, the road law that we live under now, requires that we pay our tax sometime during the first half of the year. In our township we have three supervisors who are not competent, as I understand it, to serve. They hold a meet-

ing once a month, or something like that, and divide up the road making between three, four or five road masters, as the case may be, allotting so much road to each road master. These road masters generally see to it that most of the good roads are made right in their neighborhoods, and the outlying districts get along as best they can, and pay the tax. In the first place, the farmer should have a chance to work out his taxes, if he wants to, and he should be able to find out before hand from the road master when he will be in his neighborhood, and the road master ought to try to arrange it so as to give the farmers a chance to do this after they are through with their heavy work. Under the old law, the road master had to come to the farmer and collect his tax, and give him a chance to work it out; now the farmer has to carry his tax to town, and when he wants to find the road master, he cannot do so; as a result, the farmer must pay in cash.

As to the State Road—we have three sections near Bedford Springs. We have three supervisors living near Bedford Springs, and they have seen to it that they got this road in their own neighborhoods, but where I have traveled over them they give good satisfaction, but we would like to have a different system regarding the road tax.

The CHAIRMAN: This discussion is now open to any one; if you have any suggestions, we will be glad to receive them.

MR. GOODERHAM: Senator Wertz, the Senator from our county, has been speaking of the way they make roads in New Mexico and Texas. They pound the roads, and then use what they call a sheet roller, making a good, solid road. Does any one know anything about it?

MR. BARBER: Mr. Chairman, I am only a supervisor, but I want to say that when the gentleman spoke about the old law, I am glad that the old law of working out taxes was abolished. I think there was more dissatisfaction in regard to it than over any other law. When the new law went into effect, our township was one of the first ones to abolish the work tax. We had at that time received 8 to 15 per cent., and we are now entitled to two years' back pay from the State. When it comes to the State Road, when we went to put in an application, our Commissioners refused to sign it; why, I don't know. They were talking about taking them to Court and making them sign it. What I should like to know from Mr. Hunter is whether there is any law that will give us that 15 per cent.

MR. HUNTER: As to getting that back pay, it will depend entirely upon what influence you have with the present Legislature to get them to make an appropriation. The Supervisor Act that was enacted in 1907 carried with it an appropriation of 15 per cent., or rather 15 per cent. of the cash tax raised in 1908-9, but that act was vetoed by the Governor because the appropriation was embodied in the act. If the act had been separated from the appropriation, it would prabably have been signed, with the appropriation cut. But I believe there is a bill being prepared that will consider the 15 per cent. that has not been paid. Some of the members came to my office this morning, inquiring as to the amount it would require to pay the various townships that have filed their claims.

In reference to the question which the gentleman over there to the left asked about the sheet foot roller—the sheet foot roller is a roller that has a foot on it that revolves like this. The streets are plowed up, and saturated with a heavy asphalted oil; after it is plowed and oiled, they plow and harrow it again, until they have a smooth road. How it will wear in this section of the State, I don't know. There are two roads of this kind that have been put down in New Jersey—one near Camden. We also have one in Cumberland county, where we will watch the results. They also have one in New York, where they are watching results.

You had another question, I believe, sir.

MR. BARBER: About the County Commissioners refusing to sign our application for a State Road.

MR. HUNTER: The act provides that where the Commissioners will not sign, there is a law that will compel them to do so, and the Supervisors can file their application with the State Highway Department.

MR. STOUT: If I understand correctly, there is a project on hand to build an automobile boulevard from Pittsburg to Philadelphia, and I hear a great deal of criticism from the different parts of the State in regard to it. Those in the northern part of the State say they would have to travel quite a distance to get on that road, while those in the southern part say the same thing, and they complain they would have to pay the taxes. Now, I would like to get a concensus of opinion on this matter.

MR. SEAVY: Up in Crawford county we have a State Road, built by the State Highway Department, at a cost of eight or nine thousand dollars a mile. It has been in use less than three years—some of it not that long—and is giving out already. The price seems too high for the roads we are getting, and we think we have gone far enough in that line as an experiment. Our people are inclined to think that the way it is built makes it too expensive to repair. These roads are not what the people of Crawford county want.

MR. WELD: Mr. Seavy's complaint is similar to ours in Warren. We have had it about three years, and it is giving out in a good many places. The township through which it runs is complaining very bitterly about the expense of keeping it and other roads built this summer, in repair. The roads built last summer are already in bad repair, although they are not on hilly ground, and we feel that if much of it is built in that township it will certainly increase the taxes to keep it in repair.

MR. MESSINGER: Mr. Fenstermaker called on me a while ago to tell about the concrete road in my county of Northampton. I am almost unable to do any talking, but will say that we have built some road in our county. One, known as the Delaware River Road, was built about five years ago, and since then it has cost the people practically double to keep it in repair. The county also built a road from Bethlehem to Nazareth three years ago, a distance of nine miles; this last year it was in such shape that it required the practical building of a new road. What the exact cost was I don't

know, but it was within 80 per cent. of the original cost. The State is building a road from Easton to Bethlehem—about eleven miles. They started about two years ago, and built about half the distance. Then last spring when they started in again they found that they had practically the work to do over again. Heavy vehicles and automobiles had about worn it out. Right around Nazareth we have the cement belt of the United States, and they built there about half a mile of concrete road. The other day when I passed along there on the trolley, a man sitting alongside said to me, "Why, they are washing the streets!" I said, "Yes, it is a concrete road." Now, it is a little too early to know much about it, but we people who come from that section believe it is the road of the future. You can make a very nice road of Macadam, but the elements take it away. Cement is not that way. It is put on in solid form, and remains so. I was asked different questions here today—"How about curbs on the sides?" You can put some curbing up; it need not necessarily be a concrete, although that is best. I heard a lady ask a question here about the concrete road, and say that it does not last. That is not the fault of the concrete, but of the maker. If it is mixed in the proper proportions and put down properly, it will stay there a thousand years and be as good as it is today.

MR. KAHLER: I would like to ask Mr. Hunter whether he can explain a little along the line why these roads do not seem to wear. Now, the sentiment in my county is similar to what I heard here. There is not as much sentiment in favor of the State Road as there was a few years ago. Now, it would be a satisfaction to me, and probably to these gentlemen, if you could give us a little talk along that line.

MR. HUNTER: There has never been a structure made yet but what will wear out, and the more a thing is used, the more it is liable to wear out. The experience we have had in Eastern Pennsylvania is that the Macadam road has given a great deal of satisfaction, and will continue to give it. Unless roads are kept in proper repair, they will become filled with ruts, and when you once give the water a chance to get down into a rut, it will widen that rut and make it deeper. Then again, some of the wear is necessitated by the material we were compelled to use. While there is an abundance of stone in Pennsylvania, very little of it is any good for road making. The best is right here is Eastern Pennsylvania. We have limestone, but out of the twenty-eight varieties of stone that are known to exist in Pennsylvania, not more than six or eight are good for road making purposes.

MR. KAHLER: Why are they put on, then?

MR. HUNTER: Because it would not pay to bring trap rock all the way from Birdsboro, Berks county, and we must necessarily use what is near by. I want to say that the material used in France and England is no better than the limestone we use, but they keep their roads in proper repair. Their system of building roads is not as good, in many cases, as ours—certainly no better—but their system of maintenance of roads is better than ours, two to one. This system of maintenance cannot be kept up by the men who worked on dirt roads. You can't take a boy from High School, and expect

him to graduate from the senior class of the University the first year. The same thing applies to the men who have worked on dirt roads, when they come to work on State roads. They have not had the time or practice to keep them in repair. Now, in my own section we had roads built in 1891, '92 and '93. After six or eight years of use, these roads needed very little of anything. After the advent of the automobile, these roads commenced to need more attention, and the immense amount of traffic that has passed over all the roads of this state the last few years, has caused severe wear on every one of them. Now, the auto travels over the ordinary roads at a speed of say twelve to fifteen or twenty miles an hour, and raises dust all along the line until the machine fades away. The auto does not replace any damage, while the horse and the wide tired wheel help to keep the road in repair. One reason why the roads wear out so fast under this heavy traffic is that the dust is raised and not replaced. Now, there are preparations of tar and asphalt that will keep down the road for a year or two, but we have paid very little attention to them, because my thought has been to get some preparation to mix with the stone, and make a more thoroughly waterproof road than by sprinkling with oil on the top of the road. That means we will have to spend six hundred or a thousand dollars more, but I believe it will pay in the end; there will be less expense in keeping the road in repair.

The gentleman spoke of concrete. We have made an experiment in concrete, and have put down several sections of it in this season, and I believe we will get good results. We have also put down some brick pavement, but in doing so, I decided it was not a cheap thing to do, because in order to get good brick to the locality in which it was to be used, we had to ship it, and in eight or ten years the cost of maintenance would be as much as it cost to build the road. I believe that the Telford-Macadam is the best country road where we can use trap rock finish. I do not believe that either brick or concrete is an ideal country road. It is not a good road for the automobiles, and for the horses it is bad, unless you find some way of shoeing them so that the impact is not so hard as in the ordinary way.

DR. CONARD: Is not the ordinary concrete road too smooth for horses to obtain a good foothold?

MR. HUNTER: Not in the way I have been putting it down. In putting it down I have put on a ¾-inch crown and allowed it to spread, so that the horses have a rough surface to stand on. I gave it a pretty thorough trial on the hill at Mauch Chunk, on the grade towards Packerton, and there have never been any reports of inconvenience to horses. We have also tried a mixture of asphalt—92 per cent. asphalt; that is out here on the extension of Walnut Street. I am putting it here to watch the results before saying it is the best, although I have known for some time that a good, strong asphalt material will be the best thing to use, because in asphalt you have a binding quality that the tars do not have.

MR. TAYLOR: I would like to ask the gentleman a question: You built a road in Washington in the neighborhood of Hickory. The township has since put in a brick road by the Wabash Railroad.

Now, we are intending to put down another mile. We are using a brick made of coal, I believe. It is made by the Pittsburg & Buffalo Brick Company and called the "Juniata" brick. Would they be more expensive than what you have spoken of in your experiment?

MR. HUNTER: Ordinarily the brick arrangement costs from 75 to 85 per cent. more than the Telford-Macadam road. The preparation I spoke about will probably not cost more than 2 per cent. above the cost of the Telford-Macadam, depending altogether on the location, and how far the material has to be carried from the railroad. There is just one advantage that I think I see if these roads can be furnished with this asphalt mixture—that is, that many of the hard sandstones that we find here in Pennsylvania and that have no inherent cementing qualities in themselves, can be used with that mixture. If so, it will materially lessen the cost of the roads in these portions of the state remote from the railroads, because the natural stone can be used.

MR. DORSETT: Mr. Hunter said something about there being twenty-eight different varieties of limestone in the State, and only six or eight of these being fit for road-building; I would like to know where he has used the six or eight.

MR. HUNTER: I can't say exactly, offhand. I think in Blair, some in Centre, and some in Lycoming. The limestone that we used in the northern part of the State comes mostly from Buffalo, and I might say that limestone is very hard, and bonds harder than the trap rock, but once bonded, it is very good. In the Western part of the State we use trap rock from Youngstown, and up in Beaver county they have a trap rock there that is very good.

MR. DORSETT: I am interested in this discussion, and I think this is the right way to get at the thing—to get together and talk it over with the Commissioner himself. During this year I have been in nearly every county of the State, and have probably traveled over as many miles of this road as the Commissioner himself. And I am frank to say, that I have not traveled over a single mile of this road that is meeting with the approval of the taxpayer. We have in Pennsylvania, in round numbers, 1,000,000 miles of road, and 97 per cent. of these roads are dirt roads, and the problem which confronts the farmer today is how best to improve these dirt roads. I am of the opinion, and I believe that the gentlemen who are here in session today, are of the same opinion, that we have had enough experimenting under the present system of road building. We were told in the beginning that we were to be given a great object lesson, and I believe we have had it. I think that the time has come when the intelligent body of farmers, such as are in session here today, should formulate something and send it to our legislative body to be enacted, and I believe we should send them something that will eliminate the county and the township and make them State Roads in fact as well as in name. Let this be done, and then let the State get the money from the corporations, and corporate interests and return it to the counties at the rate of $50 for every $100 that a township raises. Then we will begin to get good roads.

I believe, gentlemen, as has been said here a number of times, this is an important question. It is a very important one to the farmers of the State, and I think, gentlemen, something should be done to give us a better system of roads and road-making. I do not know whether it is in the material, or whether it is in the way the material is used, that these roads cost so much, and are of so little value. Mr. Hunter says it is a matter of education. I agree with him, but I think the first thing to do is to select men for road building who know something about it—not men who never saw a road built. Select men because of their qualifications, not because of their political faith or anything else.

Now, gentlemen, perhaps that is enough. I am not here to criticise or to find fault. If we can believe the reports made by our National Government, we have good roads that cost $4,000 a mile, while I understand that in Pennsylvania the average is somewhat nearer $10,000 a mile. Now, I hope the suggestions made here this morning will be carried out, and something sent up to our legislative body that they may have some indication as to what to do to improve our present system of road-making.

MR. GOODERHAM: I would like to ask Mr. Hunter a question: When you spoke of the good road built in Cambria, did you refer to the road built near Johnstown?

MR. HUNTER: We used practically the same thing in that county.

MR. GOODERHAM: That is my county, and the road is practically a wreck.

MR. HUNTER: That was built three years ago, and the automobiles run over it at the rate of thirty and forty miles an hour.

MR. GOODERHAM: We were told there that we would be put to practically no expense for repairs.

MR. HUNTER: I never said that.

A Member: Now, I want to know whether another six inches increase of depth would not be better than adding 6 inches to the top?

MR. HUNTER: In reply, I would say, no; it is not necessary to have any great weight of material in the roof. The surface has enough—more than enough—to keep the moisture out of the soil. As long as you keep the sub-grade dry, you will have a good road; if by any reason, the moisture gets through to the sub-grade, you have a bad road. More than a hundred years ago MacAdam said if you keep the sub-grade dry, you can afford to pay less attention to the top.

MR. WELLER: Doctor, would not the cost be lessened if the townships were to build the roads?

MR. HUNTER: Some of the townships have tried it, but in practically every case they have come to the Highway Department to help them out.

MR. McHENRY: I would like to ask Dr. Hunter if the system is a combination of the Telford and Macadam systems.

MR. HUNTER: It is the Telford-Macadam system. The Macadam system is a system of broken stones of larger size placed at the bottom, with the top size not larger than a man could place in his mouth. They were originally broken by hand for the roads in England. Now, Telford practically started his work some years before MacAdam did, and his method was to place the foundation the same as we are now doing. We do it because we can utilize the natural stone, and it makes a good drainage. It is the best system for our roads, perhaps, because of the drainage, and because we can utilize the natural stone.

MR. McHENRY: I wanted to ask that question because I was under the impression that MacAdam used the larger stone in the bottom, setting it up and letting it go. We have not had them in our county, and I have not tried them enough to know whether they are good dry weather roads; I believe they are good wet weather roads. In our town of Indiana there is one road that was covered three times last year. Our extraordinarily dry weather of last spring simply worked up the beds, and any little shower of rain came along washed the stones away. This is important in so far as it may make it a costly road. As I said, I can't say yet. I saw this morning an attorney from our town of Indiana, and asked him the cost of building that road; he said he had figured the cost of it, and it could be made for 97c per square yard. That is cheaper than the State road.

I can give you another instance, where four or five years ago they built a road, on the railroad dump, and they simply rolled it, to get it in proper shape, and then they put three or four inches of sand on it and rolled it again, and in three or four years it was as good as any of our roads that had a stone foundation. When cement becomes as cheap as my friend Fenstermaker says it will, that will be the thing to use, I think.

MR. McCLELLAN: Up on French Creek there is a little piece of road; they told me there that the brick had been laid in there on the bottom 8 years ago. I suppose you know where it is, Mr. Hunter?

MR. HUNTER: Up across Sugar Creek.

MR. McCLELLAN: Where it runs into French Creek. But there is one thing that has been lost sight of, and that is this: the people who stand out on the road, shovel in hand, to work out their taxes, simply kill time, and then they want somebody to come along and build a good road for them. The American people are getting more and more to the state where they want something for nothing, but I think they will find before they get very far that they must either work for it or pay for it, and I think the best thing the members here today can do, is to advise those men who want to work out their taxes, to go home and work them out in the same manner as they want people to work for them.

MR. AILMAN: It has been suggested here that we have about 100,000 miles of road in Pennsylvania, and the cheapest State road I have heard them talk of is $8,000. I am not much of a mathematician, but as nearly as I can figure, at that rate it would cost about

$800,000,000 to build that kind of road over the State, and from what I can gather from the discussion here, the cost of maintenance is greater than the cost of building. If it is to cost us $800,000,000 to build them, and then three times as much to maintain them, what is going to become of us? There are some changes in view in the Legislature in regard to this road matter, that will be voted on between now and April 15th. I had three or four objects in view in getting up to talk on this subject; one was to mention this; another, to ask you to put Brother Rodgers on the program to speak on roads at our Institutes, so that I can get all the information I want on that subject; I live about a mile from the proposed great State Boulevard, and, of course, I am interested in that mile of road. What effect will that boulevard have on our other roads?

MR. YOUNG: I think the best thing about that Boulevard from Pittsburg to Philadelphia is that it will lead the farmers of the north and south parts of the State to try to get better roads in their vicinity.

The CHAIRMAN: We have a great deal of business on hand, and if there is no further discussion on this subject, we will pass on to the next subject.

MR. AILMAN: If the Commissioner would just answer my question at this time—

MR. HUNTER: With your permission, I would just say that I believe in a system of roads, and in a classification of the roads of this Commonwealth. A system in which the State pays it proportion, and the county the balance, and when a township wants to put down some road, let it be according to the standard of road-making, the bridges to be of concrete, and when we get to have a standard road system through the State, much of the work will have been done, because the grading and curbing will have been done, and be uniform in all sections. The farmers themselves can help a very great deal by using the wide tire wherever possible. It helps to widen out the roads. The roads have been made clear by the road plow, and a lot of stuff plowed up, but the automobiles come along and pound it down, and it gets into the ruts and fills them up. Then, when the time comes for the asphaltic mixture to be applied, everything will be in shape. Why, gentlemen, they talk about that boulevard; that has not been in my mind. But it has been my mind to have a system of good brick, or asphalt roads that will cover all the various parts of this Commonwealth. Then we will have good roads.

MR. OSTER: I believe that I understand yesterday that the license tax for each automobile is $3.00, and I understand, also, that the tin tags cost about $1.70; is that right?

MR. HUNTER: The average cost of the tags is about $1.35 each.

MR. OSTER: That leaves about $1.60 to go into the State Treasury. The people in our section of Bedford county have never expressed themselves otherwise than that if a man can afford to pay $10,000 for an automobile, he can also afford to pay at least $10 for his license. Now, it is a question whether the automobile will do more harm to the road than any other vehicle, but, anyhow, I think it would be a good plan to charge at least $10 for the license.

MR. HUNTER: With your permission, I want to say that there is another thing that helps to destroy the roads almost as much as the automobiles, and that is the heavy caulks and toes in the horses shoes. It is almost like putting a pick into the road and pulling it out by hand. Another thing is the carrying of heavy loads by narrow tired wagons. Now, it would not be so bad if they did not keep in one track, but they do, and in a little while there is a rut there, and it becomes deeper and the stones become loose, and the road is soon in bad condition. You want to get away from the narrow tires. It costs but little more to get the wide tires, and so much better for the road.

MR. PALMER: How about riding in one track? There is not one man in ten who goes out for business or pleasure, who does not drive his horse in the middle of the street and stay there, or he lets his horse take the road, and he tries to get near the centre. Isn't that so, Mr. Hunter?

MR. HUNTER: It certainly is.

MR. PALMER: If you try, you will soon be surprised to see how quickly you can learn your horse to go where you want him to go.

MR. HERR: I want to ask Dr. Hunter to give us the approximate cost of the Telford and Macadam road per mile.

MR. HUNTER: That is a pretty hard question to answer, but, as a rule, the Macadam will cost from 25 to 30 per cent. more than the Telford. In the Telford we can use our natural stones, but they have to be crushed for the Macadam, and in order to make a good Macadam road, you have to use the same kind of material at the bottom as at the top.

The CHAIRMAN: I see Dr. Pearson is here, and as he is a very busy man, I think perhaps we had better break off this discussion and listen to him while he has the time to speak to us.

REPORT OF VETERINARIAN.

By DR. LEONARD PEARSON, *State Veterinarian.*

As Veterinarian to the State Board of Agriculture, there are a good many things I might report on, and I believe I could report on several subjects that would be of interest to you, but the subject that has been uppermost in the minds of the Veterinary Staff is the Foot and Mouth Disease, and that is a subject that is no doubt of serious concern to many of you, so perhaps it would be well to devote to this subject the small amount of time that is available.

Foot and Mouth Disease is an exotic; it does not belong here and it does not come very often. The last previous outbreak was in 1902, in New England. The disease was exterminated there after prevailing for a number of months, and the country has been clear of it until last October, when it occurred in Michigan. It was not

known to have occurred there, however, until after the shipments of infected cattle had been made to Detroit and from there to Buffalo. The first appearance of it in Pennsylvania was in the first week of November, when it appeared in Montour county, in the neighborhood of Danville, and about the same time in Northumberland county, at Watsontown. These outbreaks are known to have been due to several shipments from Buffalo, which carried infection into several herds. In a short time, two outbreaks were found in Lehigh county, one near Lock Haven, one in Snyder county, in Juniata county, in Lycoming county, in York county, at Norristown, in Montgomery county, in Philadelphia, in Chester county, and in Delaware county. Altogether there were fourteen counties affected, and all the outbreaks in this State were traced to shipments of cattle that left Buffalo the last week of October or the first week of November. After the disease was found here, it was reported to the officials of New York State and of the United States Department of Agriculture, and the outbreak was traced back to Buffalo, and from there back to Detroit.

Now, it happens that Pennsylvania is the principal market for breeding cattle and for stockers sold at Buffalo, and more of these cattle came into Pennsylvania than go into the State of New York. Since Pennsylvania is the largest market for cattle sold in Buffalo, more diseased cattle have been sold into Pennsylvania than into any other state, although it appeared in Michigan, New York and Maryland at about the same time. The amount of infection dumped into Pennsylvania has been greater than that which entered all the other states combined. It was scattered over such a large district; it is over two hundred miles from the most eastern outbreak in Philadelphia to the most western and northern one at Lock Haven.

This disease is much dreaded by Veterinarians, because it is so hard to control, and also because there is no disease known of man or animals that spreads so lightly, so easily, as this disease.

During the outbreak in this State, there have been instances where the disease was carried several miles on the clothing of people. There appears to be little doubt about its having been carried by pigeons in Lancaster county, a mile across country to another farm. It is well known that whenever there is an outbreak of this disease in Holland, England receives some scattering infection, and it is thought that it is carried there by the sea gulls or by other birds. Foot and Mouth Disease is not a highly fatal disease; in that it can be compared to smallpox. In the last outbreak of smallpox in Pittsburg, there were 145 cases before there was one fatality. The percentage of mortality in Foot and Mouth Disease is low, but it destroys value very rapidly in every herd it enters. It often causes garget in milch cows and ruins them for dairy purposes.

Every herd that is attacked is injured to the extent of from one-fourth to one-third or one-half of its value.

About twenty years ago this disease came to Germany; they thought they would be able to control it by simply quarantining the farms, but they found that it was carried from one place to another, even where quarantine restrictions were very strict. For twenty years the disease has prevailed there, and it is estimated that the farmers of Germany have lost more than $100,000,000, while the German government has spent $30,000,000, to fight it.

When England suffered her last outbreak of this disease, about twelve years ago, the Board of Agriculture determined to fight it in the same manner as they fight the cattle plague, rinderpest, and pleuro-pneumonia. These same measures are adopted in Norway, Sweden and Denmark, and were followed in the New England outbreak of 1902. While these measures seem stringent, they are the most effective, and in the end the most economical. We have found it necessary to destroy many herds—100 herds, in fifteen counties. In appraising, we have tried to find out the actual value of each animal, and of this appraisement the State has paid one-third and the Federal government two-thirds.

At the beginning of the outbreak, the United States government quarantined the entire State of Pennsylvania, and the State of Pennsylvania quarantined the districts in which the disease appeared.

In moving animals over public roads in the quarantined district, it has been necessary to get a permit from the State Livestock Sanitary Board showing that the animals have all been inspected, and are free from any disease or exposure. We are under agreement to continue this quarantine, and to move cattle in these districts under inspection, on pain of having the entire State quarantined by the Federal government. This makes a very great but unavoidable hardship on the owners of cattle in the infected districts. There is, however, some consolation in the knowledge that if quarantine were not established the hardship would be much greater.

A week ago last Sunday, there was discovered a new outbreak in Lancaster county. If there are no new developments in the next few weeks, I believe it will be possible to get a modified form of quarantine from the United States government. I think we are about at the end of our trouble, but it is still necessary to continue a very close watch in the infected districts. The infection may lie slumbering in the hay, straw, manure, or an animal may have had the disease and recovered, but be capable of spreading the infection for several months to come; therefore it is not likely that all quarantine restrictions will be removed before early in the Spring, but it will be possible before that time to ship cattle from quarantined districts for slaughter before that time—probably within a very short time.

The British people are exceedingly afraid of this disease, and their government is taking no chances in regard to importing the disease. Just as soon as the presence of this disease became known here in Pennsylvania, the British Consul took steps to ascertain whether proper measures were being taken to control the disease, and the British government made an order preventing the shipment of any livestock to England from Philadelphia, New York and Baltimore. Since then, our exports of livestock have been very small and chiefly from Boston and Portland. Eighteen cattle steam ships sail from Philadelphia making an average of one voyage a month. They receive about $5,000 per voyage for cattle freights and all this transportation has been lost during this time. The railroads are losing heavily, although the farmers' loss is the greatest.

Now, there is only one way to overcome all this loss, and that is by stamping out the disease. It is this we have been trying to do ever since the outbreak in November. In this work, we have had the co-operation of the United States Department of Agriculture.

At the beginning of the outbreak it was agreed that the State Livestock Sanitary Board would be justified in running into debt in this matter, and we have done so. The Governor has supported our work at every point, and has insisted that no useful and proper step shall be omitted.

There was no time to stop; everything pointed to the necessity of taking steps to stamp out this infection. That is what we have done, and what we are still doing. We have incurred obligations in excess of the amount of money that has ben appropriated, and I trust there will be no hesitation in supplying funds to pay the relatively small amount of bills that have been incurred.

DR. HUNT: I would like to introduce a motion at this time. It seems to me that this Convention should not let this splendid exhibition of the efficiency of the State Livestock Sanitary Board pass without some expression. Those of you who know anything about the disease, and have followed up the work of the Board in this matter, know that it has been a splendid piece of work, and a splendid co-operation between the United States government and the State government, due to the labors of Dr. Leonard Pearson. I am not prepared at this moment to formulate a resolution naming all the parties concerned, but we owe a great deal to the Governor of this State for saying that the disease should be stamped out, and giving the Board *carte-blanche* to go ahead, as it were, but I ask that we adopt a resolution thanking these people, and asking the Legislature to make an appropriation to cover their needs, and that you allow me to write the resolution afterwards.

This motion was properly seconded, and regularly carried.

The CHAIRMAN: Any credentials that may have come in during the afternoon will please be turned over to Mr. Herr, Chairman of the Committee on Credentials.

The Committee on Resolutions was to meet at four o'clock, but that time is now past.

Now, gentlemen, please look at your programs, and note the hour of convening, and get here at that hour. This afternoon we were an hour late and lost a lot of valuable time.

What is your pleasure next?

A Member: I move we adjourn.

This motion was properly seconded and carried, and the meeting adjourned until 7.30 P. M.

Tuesday, January 20, 1909, 7.30 P. M.

The SECRETARY: The time has come and gone when we should begin our meeting. None of our Vice Presidents are here; the President, of course, is the Governor, who is not here. Now, what is your pleasure.

MR. STOUT: I move that the Secretary take the Chair.

The SECRETARY: I would rather be in position to attend to anything that may come up. I move that Mr. Stout take the Chair.

MR. STOUT: I beg to be excused, but move that Mr. Herr take the Chair.

This motion was seconded, and carried in the regular way, and Mr. Herr took the Chair.

The CHAIRMAN: We will go over some of the topics that have not been heard, as yet, including the reports of Standing Committees. Is Dr. Funk here? Not here. Is Mr. Hall here? Mr. Klinger, is he present? Neither of them here.

The SECRETARY: Mr. Chairman, I understand that Prof. Klinger has written a paper and sent it in, but it is not in my hands.

PROF. SURFACE: Prof. Klinger has sent his paper to me to be read, but I am afraid I have left it in the office this evening.

MR. BARNES: I move it be received and placed on file.

This motion was properly seconded, and duly carried in the regular way.

REPORT OF THE APIARIST.

By PROF. H. C. KLINGER, *Liverpool, Pa.*

Owing to the comparatively few inquiries that were made, the report of the Apiarist for the year may be wanting in detail and completeness.

The majority of the colonies of bees in the State are wintered on summer stands, and many of these without any special outside protection. Even with this want of proper winter care they came out of winter quarters in fair condition, and with few losses. The increase in swarms was but moderate.

The crop of honey throughout the State varied much. Some sections reported an entire failure and others a "bumper" yield. The central part of the State reported a very small amount of surplus with scarcely enough for wintering, while the east reported a good flow of an excellent quality. The largest yield came from the White and Alsike clover. The cause of such a difference in the crop is likely due to the severity of the drought in various sections of the State.

When we view the possibilities of the bee-keeping industry in this State and compare it with its present condition, we must conscientiously say that it is but in its infancy. Pennsylvania has a honey bearing flora perhaps excelled by no other state in the Union. Among the first plants in spring, we have the soft maple and willows which may not yield so much nectar but give pollen and stimulate brood-rearing. Following this are the fruit-blooms. The black locust gives an excellent grade of honey but its period of bloom is not very long. The Pennsylvania Railroad Company has planted thousands of acres along its line in locust trees. These will come

into blossom in a few years and be ready for the wide awake bee keeper. White clover is perhaps the principal nectar-yielding plant and blossoms more or less throughout the entire season. Its heaviest flow is in the month of June. Basswood and poplar, which once were mainstays for honey, are no longer so plentiful, owing to the destruction of timber. The sumac yields a fair grade of honey and blossoms for a period of several weeks. Following these closely is buckwheat, beginning in July and lasting until late in the season. Farmers have different seasons for sowing their seed, and one living in a buckwheat section may be lucky in having his bees visit fields for four or five weeks. The yield from this plant is sometimes enormous, and it seldom fails to give a good crop. The grade of honey however is dark and usually of a very strong flavor. It does not bring as high a price on the market owing to its color and yet there are those who prefer it to a honey of a lighter color. It is usually capped a snowy white and sometimes can scarcely be told from white clover. The golden rods and asters complete the season and last until killed by heavy frosts; the honey usually goes into the brood-chamber and is consumed in the winter. Red clover yields a fine grade of honey and the blossoms are filled with it, but these flowers are seldom visited except by the Italians. The corolla tubes are too long for the tongue of the average bee, and so hundreds of tons of the finest honey remain ungathered and its fragrance is lost on the desert air. Attempts were made some time ago to breed bees with longer tongues with but little success. A greater result can be accomplished if some Luther Burbank will train us clover with shorter corolla tubes. He will not only assist the bee-keeper but will help the farmer as well by increasing the yield of his seed because the honey-bees will then pollenize the clover blossoms.

It is becoming more generally known that alsike clover mixed with other clover makes an excellent hay and pasturage; that it seldom fails in "catching" and that it is more persistent in the soil than the red clover. Where apiaries are located within reach of alsike fields large quantities of honey were reported. The grade of honey is the very best both in color and flavor. What better could be done than to urge the sowing of this plant to increase the honey crop and better the quality of the hay. The price of the seed is the same as the other clover usually, the grains are not as large and so the same amount of seed will cover a larger space of ground. After we shall know better how to grow alfalfa in Pennsylvania, we will be able to report another valuable addition to the honey flora of the State. With this profusion of honey-bearing flowers, lasting and covering the whole State, and with the additional assistance of the farmers by sowing the clovers, there is no reason why Pennsylvania should not be placed at the head of all the states in the production of honey.

Of the races of bees, there are a number, from the common black bee to the golden Italian. The black and hybrid are perhaps the more common throughout the State. Various races such as the Carniolans, Cyprians, Caucasians and Banats have been introduced and tried. Some of these races are more gentle to handle but what they excel in one good quality they lose in another, and the consensus of opinion is that certain strains of Italians are to be preferred as the best honey gatherers and the most profitable.

Apiculture is one of the most interesting of vocations, yet it is not unattended by failures and reverses. The Apiculturist has enemies to contend with as well as diseases to fight. The disease of foul-brood which prevails in different parts of the State has been known to wipe out entire apiaries. It is to the bee what smallpox is to the human race, and is as deadly in its contagion. A single bee, carrying a load of honey from a diseased colony, may infect a whole apiary, and if proper precautions are not used the disease will destroy the whole apiary in a short time. A number of states have passed laws for the control of this disease. State inspectors are appointed whose duty it is to inspect apiaries with the power to use remedies to control the disease similar to the powers of other departments of the State with reference to other diseases. The Pennsylvania bee-keepers tried to have a similar law passed in this State, but so far have failed. It is the sincere hope that this Board will give the Association their support in the passage of a law during the present session of the Legislature, to stamp out this disease and place this State on equal footing with other states.

There is no line of work that affords a keener pleasure and deeper interest than keeping bees. It gives an opportunity for nature study, and with proper attention will bring in ample rewards for the labor expended. Apiculture is a branch of agriculture and its relation and value to it and to horticulture are perhaps not fully understood. Bees help in pollenizing the blossoms of plants and fruits and help Nature in perfecting its processes. The fruit grower has no better friend than the bee-keeper. On the other hand the fields and orchards that are not visited by bees waste upon the air a fragrance and delicious sweetness every day that would satisfy many an appetite and even grace the table of a king. The horticulturist and the farmer are friends of the bee-keeper in supplying the pasturage for his bees, but when the horticulturist and the farmer becomes a bee-keeper also, then he will realize the truth that "the Lord helps him who helps himself."

The CHAIRMAN: Is Dr. Groff here?

Dr. Groff was present, and read the following paper:

WHO GO MAD?

Insanity Not a Rural Disease.

By DR. GEO. G. GROFF, *Sanitarian.*

Frequently, views widely held, and zealously propagated by earnest writers and speakers, have yet no basis whatever in fact. Such is the belief that insanity is especially a disease which attacks people who live on farms and in small country villiages. The idea has recently been put forth in the following form:

"It has almost passed into a proverb that the chief recruits to the insane asylums are farmers' wives and women from small quiet

centres, whose horizons are so narrowed that at last the contraction shuts out reason. The tendency to this dreary state of things is far from being the woman's fault; it is her misfortune, and one does not have to look far for the cause. It is not want of money, but want of opportunity and the must-be-so-because-it-always-has-been-so attitude which limits her horizon."

The statement is varied in many other forms: "Two-thirds of the inmates of our lunatic asylums are farmers' wives"; "Statistics positively show that the largest group in our insane asylums are farmers' wives." A popular lecturer at our Chautauquan assemblies repeated the same thing over and over again during the past summer. The above statements have been made during the year by two of the best known American women of letters, probably without their ever thinking for a moment that they are without any foundation. The latest statement comes from Kansas and reads: "The majority of the inmates of the insane asylums of the Western States are farmers' wives."

The statistics from none of our states give any ground at all, for such statements. A recent report of the Pennsylvania State Board of Charities assigns isolation, as the cause of insanity in three cases only, out of a total of 1,866 patients admitted into the State asylums that year.

In the year above named, there were in the insane asylums of Pennsylvania, the following persons, viz.:

Single men,	2,963
Married men,	1,434
Single women,	2,078
Married women,	1,653
Total,	8,128

There were admitted during the year, to all the insane asylums of the State, the following:

Total males admitted,	1,060
Farmers,	139
Laborers,	257
Merchants,	27
Miners,	61
No occupation,	59
Total females admitted,	806
Daughters of farmers,	28
Wives of farmers,	32
Widows of farmers,	6
Total women from farms,	66
Daughters of merchants,	23
Wives of merchants,	25
Widows of merchants,	13
Total women from merchants' homes,	61
Total wives of laborers admited,	69

In a recent year, there were admitted to the insane asylums of New York State a total of 4,862 cases, and the cause isolation is not once assigned in all this large number. 861 of these persons were women in domestic service, 100 women in "Educational and higher domestic duties," 199 were women employed in sedentary occupations and 205 had no occupations whatever. No farther information can be gathered from this report as to occupations.

The Superintendent of the Kansas State Hospital, at Topeka, writes in reference to the insane on Western farms:

"I have observed the overworn statement, about Western farm life causing an unusual ratio of insanity, with some annoyance, yet, I suppose the newspaper and magazine writers will continue to overwork it, as the occasion presents itself. Of course there are more farmers and farmers' wives insane in the Western States, than any other class, simply for the reason that Western States are largely agricultural, and we have a very much larger agricultural population than any other occupation. There is no foundation whatever in fact, for the erroneous statement."

The following statistics are secured from a recent report of the Topeka (Kansas) State Hospital:

Total number of inmates,	1,001
Single men,	433
Single women,	122
Married men,	221
Married women,	225
Farmers,	218
Farmers' wives,	128
Farm laborers (men),	147
Domestics from farms,	14
Daughters of farmers,	38

Number of cases in which isolation is the assigned cause of insanity:

Men,	3
Women,	1

The truth is, we are absolutely uninformed as to the brain lesions which cause the greater number of cases of insanity, and we know of no single specific cause or group of causes, which always bring about psychic disease. It will be seen by the above statistics that there are more men than women in our insane asylums, and about one-fourth more single women than married women. There are more than twice as many single men as married ones insane. In the year above referred to, there were admitted into the insane asylums of Pennsylvania, of wives, widows and daughters of farmers, 66 persons, of the same persons from merchants' families 61, yet perhaps there are ten farmers' families to one merchants' family in the State. In the same time there were admitted 139 farmers and 257 laborers, and 69 wives of laborers. These statistics certainly show that farmers' wives do not fill the asylums.

It is not true that farmers and their families live lives of solitude without rational pleasures. It is generally recognized that a life close to nature is good for children, that the country is the best place in which to be born and reared; that it is the place in which to spend vacations in order to recuperate body and mind; that it

is the place to which to send the overworked, the despondent, the nervous. But the country with its pure and wholesome recreations, its close communion with nature, is equally good for mature men and women who are in sound health. Just as the country makes boys and girls sound in body and mind, so it keeps men and women in the normal state of body and mind.

It must not be forgotten, that every industrious person in the country is able to provide for himself and his family, needed food and clothing. The intense competition, the extremes of poverty, the unwholesome over-crowding, the immoral environments of great cities and many smaller towns, are not found in the country. Every one can have a comfortable home, be well fed, and warmly clothed, and free from the thousand worries of the poor in the cities.

"There is no isolation. There is fredom, splendid freedom from servile care where the wind blows free over range and forest, and if the multitude of humble bread getters in the cities could only be brought to realize the advantages of country life, the tenements would show a surprising depopulation. In the country, the rich find greatest recreation and the extremely poor a better living than they could glean from the world elsewhere."

It is unjust to all rural dwellers that these misleading statements should be continued. Rural dwellers are no more, but really less subject to this sad affliction than town dwellers. A recognized authority on nervous diseases writes from the West: "It has always been my firm conviction that the outcry against farming life in relation to phychic disease is not based upon facts, but is the offspring of deeply rooted superstition."

Many persons have an idea that disease originates in the country and is carried to cities. This is incorrect. The closer people live together, the better disease flourishes. Disease is always prevalent in cities and towns and spreads thence to rural districts. This is true of communicable diseases like tuberculosis, diphtheria, typhoid fever, smallpox, etc. There is no doubt at all about the truth of this statement.

The SECRETARY: I want to say that we are gratified by this report, and thank Dr. Groff for having taken the pains to gather these statistics. But I want to know, now, whether the Doctor has any statistics showing the percentage of baldheaded men in asylums.

DR. GROFF: There might be, but I have not gathered the statistics. If you kept your head cooler, perhaps you would not be quite so baldheaded. You wear your hats too much; now, if you wore the same kind of hats that the ladies do, there would not be so many baldheaded men. We all know that there are many more baldheaded men than women.

The SECRETARY: Will it do any good if we begin to wear that kind of hats now?

DR. GROFF: I am afraid they will hardly look well on you now.

The CHAIRMAN: Not long ago I was in conversation with an Irishman, and he said "I'll tell you, Mr. Herr, that there never was a baldheaded fool."

What shall be done with this report?

A Member: I move it be received and placed on file.

This motion was properly seconded, and carried.

The CHAIRMAN: The next topic is "Farm Economics," by Dr. Hill. Is he present? No response, so we come to the evening program. First, comes the report of the Microscopists and Hygienists. Is Prof. Cochran here? Not here. Well, is Dr. Bashore present? Not here either. We will then take up the report of the Entomologists. Is Prof. Surface here?

Prof. Surface was present and read the following report:

REPORT OF THE ENTOMOLOGIST.

By PROF. H. A. SURFACE, *Entomologist.*

May I be permitted to say, as a preface, that I recognize at present, more than ever before, the importance of these annual agricultural meetings, and the presentation of reports by specialists. At one time the question came to my mind, as to why this should be, but now, however, I recognize the importance to our agriculturists, of having specialists who will watch throughout the year for important developments in their respective fields, who will annually give to their fellow laborers a brief review of the progress of their respective subjects during the year, and offer suggestions that may be useful for the future.

1. As an Entomologist, it is my duty to report upon the most conspicuous injurious insects coming to our attention during the year 1908. Among these the San José Scale ranks first for actual destruction effected. It is still destroying not only thousands, but millions of dollars worth of trees in this State, and has in many cases killed the trees entirely, leaving them dead and bare, although, fortunately, many persons in each county have learned to control it, and produce first-class fruit in spite of its presence. Based upon the knowledge of this fact, many persons are planting more extensively than ever before, and there is distinct evidence that fruit growing is to be differentiated from farming, and most of our fruits will be produced by horticulturists, and our farm crops by agriculturists.

The San José Scale, while destroying neglected trees, has in many cases been a benefit to progressive fruit growers. It has forced them to study the subject and produce more and better fruits than they would have had, were it not for the scale. An example of this is seen in the results of Mr. D. M. Wertz, of Quincy, who on only 140 acres of land produced and marketed $60,000 worth of peaches. Another, is that of Mr. C. C. Gelwicks, a banker of St. Thomas, who cleaned up a badly-infested apple orchard with two sprayings of the Lime-sulfur wash. This is the material that was used in each instance, and is today both the cheapest and best remedy for the San José Scale.

2. The Brown-tail Moth is a most serious pest which has not yet found its way into Pennsylvania, so far as we know, but we stand in imminent danger of its immediate introduction. This winter hundreds of shipments of seedlings, nursery stock and rose bushes from France to the United States have contained the larvæ of this most destructive moth. Mr. Atwood, Nursery Inspector of New York, reports having found almost two hundred webs on imported nursery stock, and Prof. Smith, State Entomologist of New Jersey, reports having found it in each shipment of imported stock he has thus far examined. I have received specimens for exhibition at this meeting, and here exhibit them. These are the nests in which the pest passes the winter as small larvæ or caterpillars. They are quite conspicuous, being two or three inches in length, and look much like the webs of the tent caterpillars, but have the webs woven around the twigs, and are not found only in the forks of the twigs, as is the case with the tent caterpillar webs. Those who know of the damage by the San José Scale think that we have realized the worst, but in comparison with the Brown-tail Moth, the Scale is a creature of but little consideration. The moth larvæ devour the foliage of all deciduous trees, rendering them as bare and brown in midsummer as they are in winter time. It will go through our forests and destroy them, as well as orchards and other trees, causing a wreckage that is not computable in its results.

This is to be seen in the State of Massachusetts, where it has become established, and where private individuals have spent thousands of dollars in trying to rid their premises of it. The State of Massachusetts appropriated $300,000 toward suppressing this and the Gypsy Moth, and the United States government appropriated a similar amount for this work in the same State.

Not only is the Brown-tail Moth destructive to the foliage of most trees and shrubs, but the hairs of the caterpillars are deciduous or "shed" and they have nettle cells connected with them. They fall upon the skin of persons passing beneath the trees and cause serious irritation and rash, actually keeping people indoors and off the streets at times when the hairs are falling. At the close of this address I shall show some slides illustrating a few features of this important pest.

Our farmers and fruit growers should become familiar with such pests in order to watch for them and co-operate with the State Department of Agriculture in preventing their importation or start in this State. We are now in touch with the importers of nursery stock and doing all that is possible to inspect such stock at the time it is unpacked, and thus prevent the introduction of this and similar pests. Your Entomologist is to go next Tuesday to New York to attend a conference of Eastern State Entomologists regarding this pest.

3. The Codling Moth is one of the arch enemies of the fruit grower, but has been well suppressed this year by spraying with Arsenate of Lead, 2 lbs. in 50 gallons of Bordeaux Mixture, made with three pounds of Copper Sulphate and four pounds of Lime. This, however, has this season caused unusual russetting of the fruit, and we therefore recommend for the first spray (just after the blossoms fall) reducing the copper sulphate to two lbs. instead of three. One of the chief features of the Codling Moth spray has been the use

of Arsenate of Lead in preference to Paris Green. One reason for this is that the former sticks so much more readily to the fruit and there is not so much danger of burning either fruit or leaves.

4. The Angoumois Grain Moth. This pest has proven very destructive in wheat in the southeastern portion of the State. We have had many complaints of injury to wheat; and several samples of grain damaged by it were received. This insect in the adult stage is a winged moth which, in color, size, and manner of flight resembles the little clothes moths which are frequently seen in houses. Samples are herewith exhibited.

There are at least four broods per year. The moth of the first brood flies and lays its eggs about the time the wheat comes into head. The second brood appears just after the grain is mature. The third, during warm seasons, comes about the middle of September, while the fourth brood appears in grain stored in barns about the middle of October. It passes the winter in barns and granaries, particularly in bins where the grain is stored. The eggs are laid beneath scales of chaff in the grooves of the grain. The damage is done by the larva which feeds within the grain, rendering it nothing but chaff, and, of course, quite worthless for milling purposes. Evidence of the pest is to be detected by breaking open the grain, but when there is much infestation, it is detected by the heating of the grain in the bin, due to the gnawing of the larvæ.

When the grain is left in the straw, or unthreshed, the moths have opportunity to scatter among the heads and lay their eggs very extensively, but when it is threshed early, and the grain stored in bins, the moths can only lay in the top layer of grain, and thus are not nearly so destructive. After complete growth within the grain, in about twenty to twenty-four days, the larva transforms into a pupa or chrysalis, which is likewise within the grain, where it finds protection.

The chief and most important remedy is threshing as soon as possible after harvesting. If the grain be infested at the time of threshing, it should be put into tight bins and fumigated with carbon-bisulphide, using one pound to each one hundred bushels of grain. The fumes of this material are heavy, and will sink down into the bin. It will not injure the grain for any purpose, even if it be poured directly over the grain in tight bins or boxes and at once covered with wet blankets to keep down the fumes. Let it fumigate at least half a day, and it will not hurt to let it remain until all trace of the fumes disappear, even though it be a week. Keep fire away from the fumes, as it is explosive like gasoline or benzine.

It is important that all wheat be cleaned up, and the mows and bins be cleaned and swept. It attacks wheat mostly, but it is also reported as being injurious to all cereals, buckwheat and chick-peas. It is one of the easiest pests to control by preventive measures, but has certainly destroyed many thousands of dollars worth of property in this State during the past year.

5. Curculios. Curculios injure peach, plum and cherry by stinging the fruit and laying their eggs therein, and thus causing the "wormy" condition and premature dropping. Only a few persons have sprayed for their prevention, and they mostly used the Arsenate of Lead, one or one and a half pounds in fifty gallons of water,

or in half strength Bordeaux Mixture, being successful in checking the ravages of this pest, which has proven so destructive by causing the premature dropping of the fruits which they infest.

6. The Canker Worm. The area of infestation by the Canker Worm in the central and northern portions of the State is decreasing, from the effects of small parasites, which destroy them. This is in accordance with our previous predictions, and we can now say we believe it will be held in check by these parasites, yet where it was present last summer, preventive measures should be undertaken soon. The important point in preventing destruction by this pest is to put unsurmountable barriers around the trees before the females crawl up the trunk to lay their eggs on the twigs. As this is done very early in the spring, even in some cases before the snow is all gone, it is important that the trees be banded very early in the spring, from the middle of February to the 1st of March, and the bands kept in proper condition to prove an efficient obstruction for at least a month. The method of doing this has been described in the Bulletins of the Economic Zoologist of the Department of Agriculture.

7. Potato Beetles. Many persons have thought that the Colorado Potato Beetle had practically ceased to exist, and to infest the potato fields, but last year this pest was very abundant in many parts of the State. Those who sprayed with Paris Green, 4 ounces to 50 gallons of water, or Arsenate of Lead, 3 lbs. in 50 gallons, were successful in destroying it; and where double strength Bordeaux Mixture was used, destruction by this pest was likewise prevented. It is evident that this beetle will appear again during the coming summer, and potato growers should order their arsenical materials soon in order to be ready for them at their first appearance.

8. Cabbage Root Worms. This pest has proven unusually destructive during the past year, and has increased rather than decreased in numbers and injury to cabbage, cauliflower and other cruciferous plants. They have, however, been controlled by two methods. The first and preferable is the use of the Carbolic Emulsion, as published in the Bulletin of the Division of Zoology for March, 1907, where results of detailed experiments are given. Second, by the use of paper disks placed on the ground, around the stalks at the time they are set out. This is also described in detail in the Bulletins.

9. Corn Root Louse and Ants. Last spring there were unusual reports of destruction by ants on young corn roots, particularly in very loose soil, but the real work was by root lice or Aphids, for the care of which the ants were responsible. We found that this destruction was less in fields plowed in the fall rather than in the spring, and occurs almost solely in fields which had previously been in sod. We also found, by a small experimental plot, that where wood ashes and nitrate of soda was used in the corn rows, this pest was much less injurious and the corn more vigorous. It is probable that the wood ashes prevented their activities while the nitrate of soda stimulated the plants to outgrow the injurious effects.

10. The Corn Stalk Web Worm or Stalk Worm (Crambus). The Corn Stalk Web Worm has proven quite destructive in corn fields following sod. However, we have found that fall plowing and early

spring and late fall cultivation prevents this to a great extent. It pays to have the soil in good condition and planting a little late, rather than early. The pests are starved out by this treatment, and the corn appears better by being planted in warm soil, rather than when cold in the early spring.

11. The Peach Borer. This pest continues to be one of the very worst pests of peach trees, and, in fact, causes more work and annoyance for the successful peach growers than does the San José Scale. Our experiments at one time showed that it could be controlled by the use of lye, one ounce in a gallon of hot water, using a quart at the base of each tree, and some practical fruit growers (e. g., Mr. J. E. Baird, of Clinton County) report it as having been quite successful in their orchards, but subsequent tests did not agree with the earlier results. It now appears that a small mound of wood ashes around the trunk of each tree is one of the best means of preventing destruction by this pest, and at the same time aids the tree to overcome other pests by adding to the soil needed elements of plant growth.

12. Peach Yellows. This is one of the unchecked diseases of plants which continues to cause considerable destruction, but as the disease germ causing it has not been isolated nor seen under a microscope, the exact cause is not known. The one direction for treatment that has been given to peach growers heretofore is to cut out and burn on the spot every tree infested with the yellows as soon as the first symptoms are seen. However, the Economic Zoologist of the State Department of Agriculture believes he has succeeded in curing the yellows by severely cutting back the infested trees, cultivating the soil about them, and adding a liberal measure of wood ashes and a handful of nitrate of soda, and water abundantly. Each and all of seven or eight trees which a year ago were said to be infected with yellows by experts and practical fruit growers who saw them, were thus treated and have outgrown this disease and have vigorous new wood with fruit buds for next season's bearing.

13. Pear Blight. This is another uncontrolled disease. The remedy heretofore has been to cut and burn blighted trees. However, so many reports from different sources have come to this office concerning the use of salt around the trees, that we have reason to believe it worth trying. No less than five or six persons have reported curing pear blight by salt added to the soil at the roots of the tree. One man stated he used strong fish brine, and it had not injured the trees, but had cured the blight. For the sake of information, I ask here if others have made use of this salt for Pear Blight with success? If so, I should like to have such a report. I shall test it this year on the one blighted tree which I have. I asked for a similar report at the State Horticultural meeting last week, and after the meeting one gentleman reported to me he had seen pear blight sucessfully cured in the orchard of his brother by the use of salt placed around the roots of the blighted trees after some of the soil had been removed.

14. Chestnut Blight. This is one of the new diseases coming into this State and proving very serious. I have here a letter and my reply, concerning this disease, taken from my regular correspondence of just this morning:

Brooklyn, N. Y., Jan. 25, 1909.

"Prof. H. A. Surface:

"Dear Sir: In December, 1908, I visited Chester county, Pa., and in natural woodland found the deadly parasite—Diaporthe parasitica—the cause of the chestnut blight. In my private laboratory I now have on native chestnut limbs, also on Japanese and Paragons, in full development, this destructive fungus. I have traced it for 250 miles across Pennsylvania, New Jersey and New York, almost to the Connecticut line. I am told it is in Connecticut. In the November issue of Conservation you will find an article by me on the subject. It would seem that extermination is not to be expected, but there may be control, so that valuable chestnut orchards will not be destroyed. My observations show the Paragon as susceptible as our native trees. This is an important fact for many chestnut growers in Pennsylvania and elsewhere. The Japanese is not immune, but it is the most highly resistant of any chestnut trees. Having studied this particular form for more than a year, it is my purpose to write a pamphlet on the subject."

To this letter I replied as follows:

"Dear Sir: I have at hand your valued letter of the 25th concerning the Chestnut Blight. This will prove to be a very serious trouble with chestnut trees in this state and have a tendency to prevent chestnut culture at this time. The chestnut worm or weevil has been such an annoyance as to make it impracticable, and this blight is the last straw, and will probably result in crushing out many chestnut growers and deterring many others from beginning it. I trust you are working on the biology of this subject and shall be able to give us something regarding the kind of remedies or preventives. I trust you will work out the full life history of this germ which will give us some aid. It may be well for us to find a variety that will be highly resistant and I am very much interested in your statement that the Paragon is as susceptible as our native trees.

The Forester of the Pennsylvania Railroad stated at the State Nursery meeting that this blight was found as far west in this State as Altoona. It seems to be spreading rapidly. Altoona, you know, is about the middle of the State. I shall be much interested in receiving your pamphlet on this subject."

PROGRESS AND SPRAYING.

Progress in spraying has been made by the use of more efficient apparatus in certain details, such as a steel-capped nozzle with large opening for spraying the Lime-sulfur wash without clogging, extension rod with an eighth-turn to permit turning the nozzle to spray the trees on three sides without the operator walking around, extension rod drip-tin disk to prevent the liquid running down on the hands of the operator, and a few other like attachments that have proven helpful to the man who realizes he must spray in order to have first-class fruit. The past year has been signalized by the further successful use of the home-boiled Lime-sulfur wash, and the appearance and successful testing of the commercial Lime-sulfur wash, which is now put on the market by no less than ten or a

dozen manufacturers. This material can be diluted to eight times its bulk and sprayed on the trees with success, and cannot at any time be used, strong enough to injure the tree. In using carbonic acid gas pressure, however, it should be remembered that it is important to dilute with hot water, and in spraying any Lime-sulfur wash with gas pressure, the use of hot, instead of cold, water is recommended, to prevent the gas being absorbed by the liquid.

LEGISLATION.

Federal legislation is in progress in behalf of the farmers and fruit growers. In this regard we recommend prompt action in favor of the passage of the United States Insecticide and Fungicide law, which provides that all insecticides and fungicides must be in accordance with the label upon them. We also recommend special Federal legislation providing against the importation of all pests, such as the Brown-tail Moth, by such means as may be found best. We recognize the wisdom of our own State Paris Green Law in giving our farmers and fruit growers a pure product, and recommend the passage of such a law concerning other insecticides and fungicides sold within the State. We also recommend a State enactment prohibiting the importation of deciduous plants of any kind, age, or size, into this State from foreign countries without both a certificate of inspection from the country in which they were packed, and also notification to the Secretary of Agriculture, or the State Zoologist of the arrival of such packages immediately upon coming into the port of entry.

The work of the inspection of orchards and the demonstrations in this State, by the Division of Zoology of the Department of Agriculture, must be recognized as successful and helpful to the farmers of the State. The Zoologist reports the inspection of 8,500,000 fruit trees, and evidences that Pennsylvania has at least 20,000,000 growing fruit trees, worth at least $100,000,0000.

It is interesting to note that the railroad companies have recently awakened to this and are joining hands with the agriculturists of the State in order to help the farmers and fruit growers. For example, recently the Cumberland Valley Railroad Company, with the co-operation of the Division of Zoology of the Department of Agriculture, ran a demonstration train all over their line in Pennsylvania, extending over a period of nearly a month, educating thousands of farmers and fruit growers in the use of material and apparatus for the suppression of the San José Scale and other pests.

The Pennsylvania Railroad Company is at present arranging to run a similar Demonstration Train over its lines in this State. Details of the plans will be announced in the newspapers and otherwise, and the co-operation of the members of this Board, their friends, and the public in general is invited in order to make this important work available and useful for the fruit-growers and farmers of our State.

During the reading of this paper, Vice-President Blyholder came in, and was given the Chair.

The CHAIRMAN: If there is no special request, we will postpone the discussion of this paper, and go on with the program. Next number is the report of Prof. Menges. Is he here?

Prof. Menges was not in the room at the time, but he sent the following address for publication with the proceedings:

GASEOUS AND VOLATILE SUBSTANCES IN FIGHTING INSECT PESTS.

By PROF. FRANKLIN MENGES, *Entomologist.*

For a number of years nurserymen and grain elevator owners have been wanting a gaseous or an easily volatilized insecticide that would effectually destroy insects and drive out rodents, while at the same time it would not be inflammable, explosive, objectionable in odor, or poisonous to man or beast. Until recently hydrocyanic acid gas was used for the gaseous substance, and carbon bisulphide as the easily volatilized liquid. Hydrocyanic acid is so extremely poisonous that many nurserymen who have been in the business for years fear to use it, and for the majority of farmers its use would be out of the question, because only a small whiff inhaled might be fatal. For fumigating grain infested with insects it cannot be used at all, because a little of it would poison a whole bin.

Another thing: Nurserymen who use hydrocyanic acid for fumigation, frequently receive small orders out of season, for which they cannot well afford to start a large fumigating plant such as is usually connected with a nursery, and therefore it is not only dangerous, but inconvenient. The easily volatilized liquid that has been used for fumigation is carbon bisulphide. This liquid is poisonous, inflammable, explosive and highly objectionable in odor—so much so that a rotten egg would be perfume in comparison. If in place of these poisonous substances, and their other objectionable features, we could get a substance that would as effectively destroy these insects without any of the objectionable features, it would be a valuable addition to insecticides. A chemical having these qualities, has been in existence in the chemists' laboratory for a long time and has been used as a solvent. Its insecticidal qualities, however, have only recently been discovered.

Tetrachloride of carbon is a colorless liquid heavier than air, and boils at 163 degrees Fahrenheit. It is somewhat related to chloroform. Instead of having an objectionable odor, it has a pleasant one. It is not inflammable or explosive, and is only slightly poisonous. Experiments have shown that it is even more effective as an insecticide than bisulphide of carbon. Carbon Tetrachloride is prepared by treating carbon bisulphide with chlorine. Chlorine is made very cheaply and carbon bisulphide is most ingeniously and economically made by a continuous process recently devised by which carbon and sulphur, the elements of which carbon bisulphide is composed, are fed into the top of a stack at the bottom of which is an electric furnace, heated to the required temperature to cause the union of the two elements. The two chemicals out of which carbon tetrachloride is made are, therefore, cheap which will put the substance within the reach of all who may need it.

Recent experiments conducted at the Connecticut Experiment Station have shown that it is as effective as hydrocyanic acid in killing the San José Scale. Further experiments will be made to show the effectiveness of this substance on all insects.

The CHAIRMAN: Next in order is the report of the Geologist. Is Dr. Harvey present?

Dr. Harvey was in attendance, and his report follows:

THE CONSERVATION OF OUR NATIONAL RESOURCES.

By DR. ISAAC A. HARVEY, *Geologist.*

In view of the peculiar business tendencies and the potency of commercialism today, is it not the serious and imperative duty of our Commonwealth, and of other states, to ascertain, as accurately as may be, the range and possibilities of our natural resources and then husband and utilize them for the common good and to the best advantage? The conservation of these important factors of our civilization, is my subject, and, incidentally, the rural members of our assembly should accord to the city members, the framing of such laws as relate to municipalities, and, conversely, the city members should concede to the rural members the discretion to formulate the laws or statutes that apply to only the country districts.

Would it not be wise to amend the statute or section thereof, relating to trout fishing, so as to restrict the number and not prescribe the length of the fish that may be caught, and thus avert the destruction of myriads of trout that are hooked and thrown back to die; as, likewise, to amend the section on deer hunting, so that the same number may be killed in a given season, as the law now allows; but no distinction be made as to the bucks and does, and so forefend the killing of does through wantonness or carelessness, as was so prevalent last season and theretofore. I say this by request, and such seems to be the consensus of opinion of fishers and hunters with whom I have talked on the subject, while the general trend of sentiment is quite similar and the feeling prevailing that the sections referred to would be more honored in the breach than in the observance.

I referred last year to the diverse soils and their undermined utility, expressing the view that this differentiation of soils invites investigation to ascertain the several uses of the same; that is, by analyses and experiment, under the direction of the State or National Government, and the benefits already derived from the work of the U. S. Department of Agriculture are assurance that further efforts would be of vast advantage, as reduced to systematic investigation; thereby indicating the specific uses and cultural qualities of the soils as the same are determined by scientific processes, and the farmer, without onerous and uncertain tests, be enabled to cultivate the same intelligently and with the most profit or promise of success. Hence the continuance of the tentative efforts of the U. S. Depart-

ment of Agriculture should be invoked by some resolution or definite action of this meeting.

But, perhaps, more pertinent to my subject is the conservation of our timber and minerals, and, apparently, the greatest concern attaches to our coal areas and supply. Direct and effective efforts towards the preservation and renewal of our forests and the restraint of timber waste are proving beneficial and effective in many states, while the Federal government is active in the premises. A most lively and vigorous interest, now so widely prevalent and rapidly extending, must soon become an efficient agency towards this much desired consummation, with its attendent benefits, and the ultimate reforestation of vast areas, now denuded, will follow; so that education in this direction is progressive and not retarded. This, with other factors operating rightly, is assurance of the restoration, also, of the depleted water power over extensive areas, where the streams may again be renewed.

The cement industry, now so important and acquiring giant proportions with its phenominal increase in production and demand, has promise of indefinite existence, with the almost limitless deposits of natural rock associated with the Lower Silurian, Heidelberg and some other limestone formations; the native cement rock being a mongrel or bastard limestone, while various combinations of other rocks and clay, with the purer limestones, seem to afford unbounded scope for experiment and actual production along this line. There seem to be no misgivings relative to the exhaustion of raw material for the production of this comodity. Our iron ores, in the form of hematites, magnetites, carbonates and mongrel deposits, are fortuitous and found in local areas and pockets and of uncertain amount when their wide range are considered, and no figures can be suggested as to their extent or continuance. The ores are only found by exploratory work and no forecast towards their value in the future, can be made.

Commercial clays are, also, usually discovered by prospecting or exploratory work, with a few notable exceptions, not being in persistent seams or beds; but found in limited acreage, local deposits and in many instances resulting from the disintegration of feldspar, shale and other rocks; while these several coal seams have their floor clays, of varying quality and the one important hard clay bed, affording the material for refractory brick in this and other states, is a persistent seam, but of uncertain quality, by reason of its rapid variance in chemical composition or structure, from place to place. No estimate of the hard, soft or plastic clays can be figured; but, in their several grades, they are of immense area, while being constantly produced, at least the softer grades, by weathering as stated, and are no cause for concern, considering the probable supply that may be revealed as required. So, the possible copper, lead, nickle, zinc, roofing-slate and a score of other minerals, of some commercial value, are yet only of incidental importance, but afford profit as discovered and developed.

But, referring to the several mooted subjects, the one of utmost interest and fraught with most anxiety, is the supply of coal, oil and gas; the coal being emphatically of more vital forethought. The gas and oil are an unknown quantity, and their production may be

proceeding in the formations or concealed rock measures, whence they are derived. Yet the loss of those valuable fuels, of inestimable utility to our manufactories and even for domestic purposes, has been incalculable and to one versed in these matters and aware of their importance, appalling. Carelessness and precipitation have lost billions of cubic feet of gas and millions upon millions of barrels of oil, which, at the present rate of production for commerce, cannot be perpetual and the reservoirs are not boundless. This waste argues the necessity for economy and methods that will forfend the exhaustion of this gas and oil supply in the near future.

Admitting the urgent importance of conserving any and all of our native resources, the one consideration that forces itself with more pertinence upon our attention is the available coal supply and the period of its probable continuance of permanence. I have given this subject much earnest attention and with a wide experience in the coal fields of our State as elsewhere, presume to submit some estimates of our Bituminous coal, upon which may be based conjectural figures relative to the amount of this fuel remaining in the several basins, and when its possible exhaustion may ensue, at the present rate of mining, wasting and increasing demand, or, at least, when it may decline to a calamity and dearth which will become an occasion for regret and reproach. In the great Pittsburg Coal Seam, of 1,100,000 acres, there remain 15,000,000,000 tons. In the workable seams above the big Pittsburg coal, and in the upper productive coal measures and local acreage in the upper barren measures, so called, there are available 5,000,000,000 tons. In the lower productive coal measures, from Bed A to Bed E, known as the Brookville, Clarion, Three Kittannings, and Two Freeports, 40,000,000,000 to 45,000,000,000 tons in seams 3 feet and upwards in thickness; and in the workable areas in the lower barren measures and intraconglomerate seams, of 3 feet or more, 5,000,000,000 tons.

The total amount of commercial coal in these series is therefore estimated to be 65 to 70 billion tons, in seams that are now considered workable for the shipment of coal, and in the finality of their exhaustion or depletion, there would yet remain, in coal beds say from 18 inches to 3 feet thick not less than 15,000,000,000 or 20,000,000,000 tons; for there are many million acres of these thin seams that can be mined in the absence of thicker coal.

Thus our ultimate coal supply, estimated I believe within safely conservative limits and upon no optimistic or fabulous notions, figures from 80,000,000,000 to 90,000,000,000 tons. I have not made these deductions upon the present standard of marketable coal in our State, but in contemplation of the exigencies that may arise many years hence for millions, yes billions of tons, now rejected or discarded, will eventually be carefully mined and frugally used. On a trip to Arizona and Mexico in 1889, for the Copper Queen Mining Co., I was enjoined by Mr. W. E. Dodge who sent me, not to apply, absolutely, the Pennsylvania standard, but was assured that a second grade of Pennsylvania coal, as so recognized, would be acceptable for smelting and other uses down there. Moreover, we are now shipping to market, from big seams, certain layers of coal that were formerly left in the mine and that could not be sold 10 or 15 years ago; while the "A" bed, of the widest extent of all our seems and

20 times the acreage of the big Pittsburg seam has only been discovered within the last few years to be a factor of more than incidental value in this direction, where formerly the coal was thought to be entirely useless. The estimate includes, also, some important areas not defined by our geological map, hurriedly constructed, and this additional extent of coal very much enlarges the figures or amount that might otherwise be suggested. I do not venture to forecast how many generations or centuries this fuel will last, but the rapid increase in demand and consumption and the waste and loss by injudicious and defective mining methods, present some startling and ominous figures, which I cannot set forth here.

In the last three or four years, fully one hundred million tons of coal have been wasted in this State, by incapable or irresponsible mining and lost in abandoned operations, where "haste makes waste" and where forty or fifty per cent. of the coal was left; while half the same value has been consumed or gone up in the smoke of tens of thousands of coke ovens, in the by-products, that, in some measure, are utilized in Europe. The dictum of the autocrats of the coal trade, to their subordinates, seems to be, "take the best and leave the rest," and the territory thus abandoned is practically condemned, as it were. Beds of coal three to five feet thick are thus left intact and, as has been said to me, millions of acres of good coal "get a black eye."

Operators oftimes complain, when buying or leasing, "we cannot recover or remove more than 2-3 or 3-5 of the actual amount of coal in a given property," an assertion that has not the semblance of fact or reason. It has been reduced to an absurdity by an exceptional few operators with whom I have talked on this subject and who are not evasive for a purpose; who say, also, that they can remove and have removed, ninety per cent. of the actual contents of a given acreage of coal. You garner a thousand or ten thousand bushels of grain and are you not sure of getting nearly the same amount, when you sell? The State has the prerogative and authority to enact laws that will restrain this species of improvidence and vandalism; for such it is. A Frenchman once said that the United States wastes and destroys enough food to feed France, and I might add that the United States has wasted enough timber to build a thousand cities and enough fuel, coal, wood, gas and oil, to warm half the population of northern Europe. Timber can be restored by nature and the native soil, and reforestation, with the arrest of prodigality and greed is probable or certain and thereby will be restored a vast range of water power to be utilized; while gas and oil may be an indefinite or perennial supply; no one knows. But coal beds cannot be created or renewed by man's skill or genius, or replaced, in any sense, by an equivalent in fuel; being produced in the long cycles of years, which will never again respond to nature's behests, or obey man's demands; so that once depleted and gone, we will be bereft. Almost as wasteful as the prodigal of the ancient parable. The possibilities of rational, consistent and circumspect business are entirely safe and progressive within a conservative latitude; the probabilities of unrestrained and erratic business, with its waste, avarice and improvidence, are dangerous. We of this generation have not been invested with the singular privilege and

discretion of gathering, grasping and appropriating to ourselves nearly everything in sight, and many things not in sight, at the cost and sacrifice of some of the most sacred and cherished values of human life and happiness, and we have no license or commission to hurt the earth; no preemption on its natural gifts.

It is a fact that "to inveigh against the use of money is to decry the inevitable," at least in this land of ours; and this truism is the efficient reason why moral suasion and logic are futile. Your prayers avail naught towards the repression of frantic and fanatic business, so-called, with its fierce and relentless competition and frenzied finance is masterful, after all, without the strong arm of the law to confine or enfeeble it. Money madness and cupidity are not a part and parcel of the record of our noble Commonwealth; not, at least, for reference, and cannot contribute to the grandeur of our national history. We may boast of an exceptional franchise bestowed by high Heaven and seem disposed to revamp and revise the tendencies and policies of other nations; while the pursuit of our own commercial idea and our being possessed of its strange fatuities, only convey to other civilized nations, that, without a resurvey, some regeneration, we, eventually, may become guilty of nearly all the folly of which any nation or people is capable. We have surpassed history in our extravagance, if you will, wastefulness, and in our disremembrance of our descendants; while in a woeful degree, we have squandered our patrimony, and, perchance, the values that otherwise might be available to our progeny.

While fully sensible of the evils that are extant in the State and nation, yet I cannot imagine any greater stigma or reproach that can attach to any generation than it may merit or incur by its disregard of posterity. Proud of our unrivalled wealth and prestige, we may advance to such a degree in the wrong direction and may acquire such a spurious prominence as to become despised in the sight of men and destroyed in the sight of God. This may be a digression, which I trust you will indulge; but it is not an extravaganza. Our dominant and predatory financial spirit, might well be portrayed on canvass as a lion rampant.

Conservation of our natural resources is only to be secured by conservation of our moral resources, and it has become obvious that correlation of the two are essential. These things are coordinate in my mind and I cannot divest myself of this conviction or dissociate the moral, mental and material forces towards our betterment and upbuilding, and am yet persuaded that a business proposition is none the less a moral proposition, while, in the spirit and genius of our institutions in the light of the Gospel and upon every principle of expediency, honor and right, an urgent political question is just as much a religious question. The entire subject of conservation resolves itself into a question of upright and faithful citizenship. The one greatest source of unselfish and honest patriotism is in the farming community; for Almighty God and the farmer gave us this nation with its glories, and it looks to me as though God and the farmer are going to take care of it.

A nation is not great alone in its structures of iron and steel, and wood and stone, or, indeed, in its policies of aggrandizement; but it is wisest and grandest in its building of conscience and character,

and we cannot transmit to our heirs, a more worthy heritage than the privilege, the opportunity to make money and manhood for themselves. Wealth inherited and unearned and without judicious training is almost sure to make mongrels in mind and morals and non de scripts in society and finance.

"Cursed be the social wants that sin against
the strength of youth!
Cursed be the social lies that warp us from
the living truth!
Cursed be the sickly forms that err from
honest nature's rule!
Cursed be the gold that guilds the straightened forehead of the fool."

Beyond good teaching, a good example and a well sustained integrity, we have no commanding duty to our children. What we do of right or wrong will logically guide or direct them. If we give to them as well as we have derived from our ancestors, the one great moral obligation to them will be rightly performed and fulfilled. The noblest legacy we can bequeath to them is a life record without reproach, and this may never be engraven on monuments of granite or marble or inscribed on tables of stone; but it may be written in the minds and memories of men and inscribed on the fleshly tables of their hearts; and conveying to them this assurance of our life's good work, and along with it, some of the precious and abounding gifts of Nature and Nature's God, those that come after us may point to these things and with glowing pleasure and pride say to the world, "see what our fathers have done for us." This will betoken the supremacy of righteous law, the exaltation of patriotism, the benevolence and nobility of our American manhood and the glory of our American institutions; and all these in the providence of God may broaden into a splendid national philanthropy.

The CHAIRMAN: Next in order is the report of W. H. Stout, Geologist. I take pleasure in presenting to you Mr. Stout.

Mr. Stout read the following paper:

GEOLOGICAL AND AGRICULTURAL OBSERVATIONS.

By W. H. STOUT, *Geologist.*

The foundation of agriculture is the earth, therefore it is the most important study associated with that "most healthful, most useful, and most noble employment of man" upon which depends the existence of the human race, deserving careful consideration. To many persons, the term "geology" is understood to have reference to the solid rock, minerals and metals and not to include the fine particles of sands and clays constituting soils. Older writers attempted to consider rocks and soils in separate classes; however, there is no longer any distinction, soils being simply the smaller particles of disintegrated rock with more or less organic material incorporated. The earth, upon which we are destined to spend a brief time, is but an atom in the midst of countless worlds viewed by the astronomer, and only about one-third of its surface above water left for us to

struggle upon for a living, and finally inherit a space three feet wide seven feet long and six feet deep, unless interred under modern ideas to the depth of nine feet, or universal cremation is adopted to dispose of the dead.

The soil beneath our feet is such a common thing, that it is ordinarily given little consideration, although our existence depends upon its fruitfulness, its preservation and not destruction and final exhaustion. Among some eighty chemical elements separated from the earth, and the almost innumerable combinations of the same, there are only a few considered as indispensible to crop production. The oft repeated elements, potash, soda, magnesia, lime, phosphoric acid, sulphur and silica must be present in proper proportions to produce successful crops, and one lacking may determine the crop yield. That a tremendous warfare, or contest of the elements has been going on for ages is not to be doubted. Heat and cold, fire and water are ever striving for supremacy. The granite foundation, constituting the earth's crust, may be compared to the slag of iron furnaces poured out in flowing streams, gradually cooled and, for a time, barren of all vegetation, but subjected to disintegration by the elements: freezing, thawing, and the carbonic acid of the air gradually dissolving and disintegrating the particles containing lime, iron, silica, etc., until the spores of lichens and other plants find a congenial condition for development.

That nothing remains permanently fixed is very evident; continents being levelled, mountains thrown up, volcanic forces always active, and the streams steadily bearing to the oceans the sediments and mineral elements in solution, causing alternate elevations and depressions, are facts beyond contradiction. The sedimentary rocks are undoubtedly derived from the igneous, carried everywhere through the agencies of water, wind, glaciers and volcanos, so evident on all parts of the earth. Torrential rains in tropical regions, a more moderate precipitation in the Temperate Zone, with snow and ice reducing to lower level mountain peaks, are demolishing the mainlands, adding the sediments along coastal plains and the ocean beds.

In this latitude (40 degrees), the average yearly rainfall is three and a half (3½) feet which in a hundred years amounts to three hundred and fifty (350) feet of water, flowing from springs, streams and surface flow, ever bearing the elements needed for organic existence. The soils upon which all animal life depends, excepting that in oceans, are therefore the most important elements and the other natural resources pale into insignificance in comparison. If diamonds, gold and silver, minerals and metals had never been discovered, the soil alone could have, and might continue to afford sustenance and life to all animal creation, including the human race.

Incorporated with the disintegrated rock particles, is the organic material derived from grasses and plants of various kinds, together with great forests that flourish during long periods, and to these were added the insect and animal remains, on the dry land and the remains of seaweeds, minute organisms, and monsters of the deep oceans, storing up the elements now forming the soil and rock. That the development was gradual is evident, from the lichens and mosses, to those of a higher order of plants, including the cereals

upon which depends herbivorous animal life, which in turn supports the carnivera, so that we have a cycle of creation, and destruction going on in which the human race, in that fine art termed civilization, excels.

In the oceans, we must look for the fertility removed from the continents, where the sediments accumulate to form fresh rock strata and deposits containing the mineral elements once in solution. That the soil removed is gradually replenished through the disintegration of the underlying rock, forming fresh supplies, is fortunate for the husbandman. It is estimated that the soil is carried away on an average, over the globe, at the rate of one foot in from three to five thousand years, ranging according to the rain fall, the steepness of slope and the texture of the rock, from one foot in five hundred years to one foot in ten thousand years, and even less in some districts.

Besides the losses sustained through natural agencies, there is a constant drain on the soil in farming operations, through the removal of crops. It is calculated that in the ordinary rotation, if all products were disposed of without restoring any to the fields, there would be a loss of seven dollars worth of plant food from each acre, if it had to be replaced from outside sources. The vast amount of agricultural products exported during many years past, has exhausted many fertile fields, which together with the loss sustained between what is removed and restored, must eventually result in diminished crop yields, regardless of the natural productiveness of the deepest and most fertile soils. The natural resources now receiving the attention of thoughtful and scientific men, are not directed to this most serious problem—soil depletion—yet it is the greatest problem facing this nation now and is becoming more serious year after year.

Pennsylvania has natural advantages, in its variety of soils, climatic conditions, and a population demanding more farm products than can be supplied from its farms, so that agriculture should be the most profitable enterprise within its borders, and the demands for farms should increase and steadily enhance in values; yet with few exceptions, prices obtained for improved land often do not cover the cost of the improvements, and there is no struggle to obtain farm property. On the other hand, operations are curtailed, farms abandoned and farm labor almost unobtainable, because the business does not afford sufficient income to permit wages paid in other less arduous pursuits, with more recreation, less isolation and shorter days. The cost of restoring lost fertility, the necessity of resorting to commercial feeds and fertilizers to secure crops, is a severe tax upon nearly all sections of this State, and becoming more so yearly, and extending the same requirements into sections where soils were claimed to be inexhaustible.

This State is fortunate in having a great variety of soils, as equally a great variety of rock, suitable for all purposes, including the making of good roads. While the trap rock is considered the best material, and where it can be obtained without long transportation and long hauls, it should be used, but it is questionable whether the people should be taxed to obtain this material for road construction, where good material is abundant and close at hand. Whenever the Devonian formation exist will be found the Hamilton shale, far

famed as composing the good section along the Delaware River west from Port Jervis, the hard Chemung sandstone, and the Catskill all with a variety of suitable material for roads. We have three varieties of limestone, about four of red shale, the Clinton, Mauch Chunk, the New Red of Southern Pennsylvania and the Old Red sandstone of the Devonian System, together with a variety of clay shale and sandstone, of various degrees of agricultural value, and at different altitudes, so we have soils and localities adapted to a great variety of crops that may be successfully cultivated within the State. Agriculture is in a transition stage, passing from the severely laborious, brute force form into a more refined and less burdensome toil, to an art and science wherein machinery and intelligence are requisites, so that the generations to follow must be better equipped than those of the past.

Geologically, there are four distinct periods traceable in the rocks of Pennsylvania: First, the tropical or semi-tropical period when the great coal measures were formed; second, the igneous period, when the molten material forming the granites and traps, burst through previously deposited formations; third, the glacial period, so well marked in the northern section and last, the tertiaries down to the present, now known as the temperate period. Nature was very profuse in storing the elements so useful to mankind in the deposits of coal, oil, gas, salt, potash salts, nitrate of soda, phosphatic materials upon which largely depend the human race for comfort, and existence, all of which are Nature's products and should not be controlled and monopolized by combinations and trusts, at the expense of all whose welfare depends upon a share of all. Tennyson writes:

"There rolls the deep where grew the tree,
O' earth what changes hast thou seen!
There, where the long street roars, hath been
The stillness of a central sea.
The hills are shadows and they flow
From form to form and nothing stands;
They melt like mists, the solid land
Like clouds they shape themselves and go."

MR. HERR: I move that the reports of the Geologists be filed with the Secretary of the Board for publication.

This motion was properly seconded and carried.

The CHAIRMAN: Is there any discussion of the foregoing reports?

MR. FENSTERMAKER: I would like to ask a question. Prof. Surface spoke of a prepared Lime-sulfur wash. Is it possible for general farmers to prepare a stock on hand, and use it in case of emergency?

PROF. SURFACE: As I understand the question, the gentleman wants to know whether it is possible to boil this wash in his slack time to be used in his busy time? Yes, sir; I have done so, and kept it for four months and used with excellent results. If you want to keep it any time after boiling, you will have to dilute it, because in its concentrated form it will crystalize. I used 22 of lime to 17 of sulphur, and when it was boiled diluted to 1-3 its total solution; you will find that this will not crystalize at all.

MR. FENSTERMAKER: That is the usual strength, is it not?

PROF. SURFACE: Yes, sir.

The CHAIRMAN: If there are no further questions, we will go on with the program. The next subject is "Agricultural Guild," by Dr. William Hill. Is Dr. Hill present? No reply. We will therefore proceed with the next topic, the "Rational Use of Lime on Land," by Prof. Agee.

Prof. Agee then spoke as follows:

RATIONAL USE OF LIME ON LAND.

By PROF. ALVA AGEE, *State College, Pa.*

There has been much discussion in recent years of the lime question and some of the discussion has been illuminating. I believe that we are getting nearer and nearer to the truth about the right use of lime as the result of extended observation and experiment and I wish to state or restate some of the facts as I see them.

There has been much irrational use of lime in the past. It has been used as a manure and many farmers have learned that while lime has increased productiveness of the soil for the time, a decrease in productive power follows if lime is made to take the place of manure. On account of the irrational use of lime there is a prejudice on the part of some land-owners against liming and very often their land needs lime and would be benefitted greatly by its rational use.

Lime may be applied to the soil to improve its physical condition and there are instances in which it may be needed as actual plant food, but I am chiefly interested in lime as a means of keeping a soil friendly to plant life. The tendency of all soils is to loose some of their stock of available lime, and when a lime deficiency comes about acids accumulate in the soil that make conditions unfriendly to bacterial life and to our cultivated plants. A large portion of land outside of the limestone belts of Pennsylvania have parted with their available lime to a point where a lime deficiency now exists and this condition is limiting the production of clover and other crops. More than this, within our limestone belts there is a rapidly increasing area of soil which has a lime deficiency. I live in a limestone valley at State College, and our scientists find that much of the land on the college farm does not now contain enough lime in available form to keep the soil sweet. The land is becoming acid and requires applications of lime to correct acidity just as truly as does very much of the land outside of the limestone areas of our state. When we first began to turn new land with a breaking-plow doubtless a diminution of the supplies of available lime occurred, and as the soil was kept loose by means of tillage and crops were taken from the land, the store of lime was gradually reduced by leaching and by removal and by chemical change as acids formed, and it appears now that it is only a matter of time when practically

all soils will reach a point where a lack of available lime will become apparent. Some of you have land that produced good clover twenty years ago and is now beginning to refuse to grow clover. Others of you have land that is producing good clover today, but will probably reach the point of lime deficiency and impaired power to grow clover a generation hence. The point which I would emphasize this evening is that the lime in our soil which is so essential to healthful plant conditions tends to grow less in amount as the years go by. Within our own life-time we have seen a large proportion of our tillable lands reach the point of where there was not enough lime to take care of harmful soil acids and as the years come the area of such land will grow greater. This is not a pleasing situation to contemplate, but it is a condition that must be met. There is only one cure for soil acidity and that is to apply something to correct this acidity and to give to the plants friendly soil conditions.

The vital question before tens of thousands of practical farmers today is, what shall be done to restore their soils to a condition friendly to the clovers. Many say that lime costs too much and that its application is unpleasant and they are not fully convinced that it would be profitable. I want to urge that if the soil is growing acid, and if the organic matter is becoming deficient because heavy sods cannot be grown and plowed down, there is no way to bring the land up to high cropping power except to apply the one natural element for the correction of these bad soil conditions, and that is lime. Men who abused the use of lime years ago applied one hundred to two hundred bushels per acre. It is not such liming that we are urging on you today. I am not even urging lime to benefit the physical condition of your land, although oftentimes applications for this purpose would pay well, but I am urging that soils be kept sweet and that means the presence of sufficient available lime to take care of all the harmful acids that tend continually to accumulate in land that is deficient in lime.

How much lime does your soil need? The only way to tell is by noting the presence of acid and trying out the matter through experiment. If your land today refuses to grow clover, the chances are that you will see a wonderful difference in the growth if only a thousand pounds per acre of lime be applied. I know land in this State that has greatly increased its clover production by the application of only five hundred pounds per acre. In a general way if clovers are refusing to grow or if general conditions are unfavorable to other sods, one should apply a thousand pounds per acre, and if the land is decidedly acid and if lime is not excessibly high in price he will do well to use one ton of lime per acre. I mean one ton of stone lime or its equivalent in slaked lime or pulverized limestone.

Many farmers are asking what form of lime they should use. The correct answer depends upon the cost of the material. Pulverized lime, which is limestone burned into lime and then made mechanically fine in order that it may be distributed with ease, contains the greatest possible amount of material for correcting soil acidity. When lime has been slaked with water, its weight has been increased while its ability to correct acidity has not been increased. One ton of stone lime will correct about as much acidity, roughly speaking,

as two tons of finely pulverized limestone. If the limestone could be made as fine as flour so that every particle were available in the soil, two tons of the limestone would correct somewhat more acid than one ton of limestone, but as we find the pulverized limestone on the market, it is safe to say that it is not fine enough to permit two tons to be as effective as one ton of the pulverized stone lime. The so-called "new-process" lime on the market is a lime which has been slaked by steam and therefore has had its weight increased without any addition of ability to correct acidity. One ton of this "new-process" lime cannot correct as much soil acidity as one ton of pulverized lime.

On the other hand the ease of application is a great consideration. "New-process" lime is easy to handle and on that account may be worth as much to the farmer as the pulverized stone lime which is unslaked and must be drilled into the ground before it slakes unless one is willing to be troubled by bursted packages. The pulverized limestone can be handled with comparative ease, but the buyer must remember that he is paying for the transportation of a large amount of waste material in the pulverized limestone as nearly one-half of it is worthless so far as correction of acidity is concerned. It is a mere matter of arithmetic how much soil acidity can be corrected with the least amount of money, the first cost of material and the transportation and the ease of application being considered.

How should lime be applied. When the general need of lime is more fully appreciated, there will be a greater demand for lime-spreaders. Several firms are making spreaders that handle lime in small quantities per acre. Where lime is inexpensive and the farmer can afford to apply forty or fifty bushels per acre, he will find that the manure spreader will do fairly even work, but when lime is costly and only one thousand pounds per acre should be applied the manure spreader is not satisfactory. The Ohio Experiment Station had a lime spreader made at a local blacksmith shop at a total cost of seventeen dollars. A V-shaped box was used with an axle passing through the box and furnishing a fairly good force feed. Old mower wheels were used for this spreader and it gave good satisfaction. Some grain drills with fertilizer attachments are capable of applying five hundred to one thousand pounds of lime per acre, but I think most men fail to get such results from their drills, and as I have said the thing to do is to purchase lime spreaders that will apply any amount from a few hundred pounds to a ton or two of lime per acre. The easiest way to make lime applications is none too good.

Lime should not be plowed down. The old way was to apply one to two hundred bushels of lime per acre on the sod and let it lie for months and then plow it down. In the case of such heavy applications the more waste the better for the land, but when lime costs several dollars a ton, the right way is to get the greatest possible effectiveness out of it and that means working the lime into the surface of the soil after the land has been broken for the crop. The tendency of lime always is downward. In much of our land the subsoil will be found to be richer in lime than the top soil. Do not plow lime down, but bring it into contact with the free acid in the top soil. Let it become mixed with the top soil and make it sweet.

We often are asked whether lime will increase the yield of corn and wheat and other crops. If land is sour, containing harmful acid the sweetening of that land with lime will result in increased yield of almost any staple product, but we do not urge any one to apply lime for the sake of increase in yield of corn, wheat and similiar crops. We wish the farmer to take a different view-point. If his land is in an unhealthy state and lime will put it into a condition friendly to plants, the thing to do is to correct that soil with lime and when that has been done he should have in mind first the production of a heavy clover sod. The increase in yield of wheat or corn is incidental. The vital thing is to make the land friendly to all plants and especially to clover, because in most farm crop rotations clover is fundamental, and continued productiveness of the soil depends largely upon it. As clover usually is seeded either with oats or wheat, the lime may be drilled into the ground while preparing the seed bed for oats or for wheat. If the farmer prefers, he can drill the lime into the ground when preparing land for corn, although I am sure that a larger amount per acre will be necessary than when applying the lime immediately previous to the seeding to clover.

Now, Mr. Chairman, I have tried to impress these facts: The tendency of soils is toward lime deficiency. Limestone soils themselves gradually lose some available lime. Maximum crops can be obtained only from alkaline soils. As lands grow old we shall be compelled to apply more and more lime to keep the soil sweet and we can get that lime out of stone lime, pulverized or slaked lime or finely pulverized limestone. The day will come when we will realize that the Creator placed beds of limestone in our lands for the benefit of humanity, just as He placed the coal beds. Just as coal is an accumulation of material for the benefit of the human race so is our limestone an accumulation of material to satisfy deficiencies that will continue more and more to occur in our tillable soils as long as the earth stands. If there were no supplies of lime we probably could look forward only to the day when our soils would be rank with poisonous acids and wholly unfriendly to plant life.

The CHAIRMAN: The next subject on the program is "A State Fair for Pennsylvania," by Mr. J. F. Lantz. Is Mr. Lantz present? I see he is. I hope that those who wish to leave will do so before this discussion. This is an important subject, one that should be placed before our Legislative Committee, and we want the audience to hear what the speaker has to say. I have the pleasure of introducing to you Mr. Lantz.

A STATE FAIR FOR PENNSYLVANIA.

By J. F. LANTZ, *Wyebrooke, Pa.*

About eleven years ago, the progressive stockmen and farmers, in connection with the old Agricultural Society, which was established by act of assembly in 1851, with an appropriation of two thousand dollars per annum, with much to discourage them in times past, but

with a patience so characteristic of the instinctive improver of animal and vegetable species, made their final rally and attempt at a State Fair, which was held at Johnstown, Pa. This act was the only law which has ever been enacted in this great and ever expanding agricultural Commonwealth in the interest of an Annual State Exhibition, and its inefficiency has been clearly in evidence for the past forty years. Year after year under this inadequate law, farmers and stockmen, together with the Fair management, were shifted over the State from one county to another, in their hopeless attempt to get up a State Fair, which would be alike creditable to themselves and the State. And, needless to say, that year after year they faced disappointment, debt, no money to pay premiums, and, what was still worse, no hope of better things to come. In vain did the Livestock Breeders of Pennsylvania try to induce the creditable breeders and farmers of other states to show their finest grain, and livestock products, within our borders, in order to give our farmers the object lessons, showing them the possibility of improvement, which we have so badly needed all along the line. But our two thousand dollar appropriation, our improvised facilities and our uncertain premiums, were no inducement for progressive farmers, stockmen and showmen to come from other states which were enjoying good, permanent State Fair facilities, under appropriations of from twenty-five thousand to one hundred and twenty-five thousand dollars per annum, and without this competition from other states, a State Fair fails of its purpose and loses its usefulness. The Livestock breeders of our State suffered the greatest disadvantage as the result of these conditions, as the patronage of high-class, pure-bred animals, which should have come to the farmers of Pennsylvania, found its way to our border and farther western states, the natural result of such conditions, and our duplicity. What else could we expect? Such is the natural tendency; the progressive, practical farmers and stockmen go to the fairs where they can see the best, learn the best, and buy the best of the kind he represents. It has always been so. Before the Old Liberty Bell ever pealed forth its notes of Freedom and Independence, before a charter had ever been issued for this Grand Old Keystone State of ours, the Celts, the Scots and the English, annually wended their way to "The Royal," "The Dublin" and "The Bath and West" there to shake hands with their competitor winners of "Royal Ribbons and Medals." And to these high-class exhibitions belongs the credit of a market in every known stock-producing country in the world, and they have made improved stock breeding the keynote of agriculture in the United Kingdom.

With a full comprehension of these conditions, with discouragements and disappointments of past years, with their trade gradually slipping away, but still with undaunted courage, that final rally was made in 1898—but without competition from other states, without paid premiums, and with repeated failure. Then it was that the stockmen of Pennsylvania woke up to the full realization of the fact that Pennsylvania had no State Fair, and never could have one under such conditions, and, so far as the stockmen were concerned, there has never been an attempt at a State Fair since, and, under a continuance of the same conditions, there never will be. That two thousand dollars would not be enough to run an ordinary vegetable show of

a Pennsylvania township subordinate Grange. Gentlemen, the West Chester Dog Show paid more than that for premiums on canines last Fall.

Closely following the last apology for a State Fair in Pennsylvania, the Livestock Breeders, throughly discouraged with the then existing conditions, decided to form an organization; the article calling a meeting for the purpose of completing this organization was written by the present Secretary of the Association, Mr. E. S. Bayard of Pittsburg, Pa. One of the chief objects set forth in this call was to devise ways and means by which a State Fair Commission might be established, which would be commensurate with our rank among the states in representing all of the industries for which our great Commonwealth is noted, and which would be in harmony with the spirit and progress of the times, and our growing industries. In response to this call, a large number of the leading and most influential stock breeders from all parts of the State assembled at Pittsburg, and the Association was completed with a large membership, in January, 1900. Individual members and officers of this Association have spent much time in research, visiting many State Fair Associations and similar high class expositions in the States and in Canada, for the purpose of ascertaining the best and most practical methods of establishing a State Fair in Pennsylvania; they have submitted their plans to the highest authorities for criticism; they have not been content with formulating plans as good as others, but they have tried to get them a little better. Its membership has been, and is now, in close touch with all branches of agriculture, manufacturing, the sciences, etc., etc., and the bill which has been formulated by them, and which is now before the Legislature, demands representation or all our interests, is the best and broadest document of its kind ever drafted, and has the endorsement of all the State's leading industries; and the Allied Agricultural Associations, now in session here, are looking forward with pride, and in anxious expectation of its passage, and endorsement by his Excellency Governor Edwin S. Stuart.

I might speak of the advantages to be derived by our agricultural interests from a good State Fair, but I think at this time, when we have so many examples of the enthusiasm, increased interest, and the improvement which has followed in all branches of agriculture, that keen competition and the high standards set at the great expositions, that it is unnecessary to consume time in discussing the benefits to be derived from a well conducted State Fair in Pennsylvania. I believe that the advantages of such a Fair are conceded by every up-to-date stockman and farmer in this State; at any rate, they all want the Fair, and why should they want it if they did not concede its advantages?

It was my pleasure to attend the Madison Square Garden Poultry Show which was held in New York a few weeks ago, and which is, I believe, the largest and best conducted show of its kind in the world. I found there the leading poultry breeders from the Pacific Slope; from the "Sunny South"; from the land north of the Great Lakes, and from New England. The best men and the best birds from all over this great land of ours were assembled in the heart of the great American metropolis. And what for? To catch the improvement

of type, conformation and feather, of the past twelve months and carry back to every state in the Union "The Standard a little Higher," which creates that enthusiasm and greater effort among all of the Poulterers, to keep pace with the foremost scientific breeders of the world. While watching the expert judges scoring the birds, and placing the ribbons, I thought of the great responsibility resting upon their shoulders; setting the standards of improvement for America, and the irreparable loss to the breeders following the standards, in the event of an error or misjudgment. Gentlemen, not one Poulterer out of a hundred in America, will ever know how much we are indebted, to the twenty years' superior management of the Madison Square Garden Poultry Exhibition or the growth and improvement of the vast poultry industry throughout our land. And I want to say to you, gentlemen, that with all our boasted wealth, and richest country, and all that, Pennsylvania does not compare with the so-called "barren sand lands," scrub oaks and pines of little New Jersey, in the breeding of high class poultry. And why? First, because they have at their doors at Madison Square Garden, the greatest poultry school in the world, and although it is only open five days in a year, they go and take their lessons, and return with higher ideals, and strive to reach the Standard. Second: New Jersey has a State Fair—a good one, and they are proud of it. I refer to this poultry exhibition as an example of what improvement can be expected from high class exhibitions when properly conducted; and what is true of this poultry show is applicable to high-class State Fairs. And I want to say to you, gentlemen of the State Board of Agriculture, that the annual fair held by the Royal Agricultural Society of England, known as "The Royal," has done more towards putting the livestock interests toward the front than all the schools in that kingdom; and I want to say, farther, that some of the breeders who produced the highest types of the breeds which they represent, never saw the Agricultural School or an Experiment Station. but were tenant farmers, whose only training in the so-called "science of breeding" was the object lessons which they received at the annual show. Is there a man here tonight who dares tell me that Ohio has not made far more rapid improvement since the establishment of her great State Fair than she ever made before? Has New York lost any of its prestige since the establishment of its permanent State Fair at Syracuse? Why is West Virginia coming so rapidly to the front as a stock-breeding state? Because she has a high-class school at Wheeling, called the West Virginia State Fair, where her farmers go annually to see and learn the improvement of the past twelve months, and that brought in from other states. They catch the high ideals, learn the correct types, and return with that enthusiasm which impels improvement. Have these states lost trade or prestige since the establishment of these high class State Fairs? Has agriculture lost any money through the appropriations to these great State Fairs? No; but on the contrary it has placed them to the very front as agricultural states; they have increased their agricultural wealth by opening up better markets for their high-class agricultural products; and by the object lessons which they have learned in the use of better seeds, better stock and better implements they have gained prestige and trade while we have lost it. The best

breeders and buyers today go to the big State Fairs where they can see the stock, meet the breeder and buy direct, and Pennsylvania has been content to remain at the foot of the class, and see her high-class breeding trade go to her more progressive neighboring states.

The only objection we ever hear offered to a State Fair in Pennsylvania is the cost to the State, and, we in Pennsylvania, are so used to this objection when appropriations are asked for in the interests of agriculture, that it does not affect us very much; we expect it; we have been up against it so many times. Well do I remember, and well do you gentlemen remember—it is not so many years ago—when Pennsylvania had an apology for an Agricultural College and Experiment Station; not many farmers knew where it was or what it was; it seemed so obscure. When we asked an appropriation from the State to put it on a creditable working basis, we were met with the same objection—"the cost to the State." After much hard labor and earnest endeavor, we did get a few small appropriations, and today the farmers of Pennsylvania and those of other states, know that we have a State College and Experiment Station. They know where to find it; and all over our great State today, in city and country, you hear our college highly commended; and the advantage to our farmers, emanating from our active State College force, is beginning to be seen on every hand. Has the State lost anything from these appropriations? Is it not a fact that the improvements at the College, and the advantages which our farmers have gained through them represents far more value to the State today than the cost of the appropriations. Now, I would like to ask how the State can lose by passing the proposed bill creating a State Fair Commission, carrying with it an appropriation of the small sum of two hundred thousand dollars for the establishment of a permanent State Fair. Would not the property and improvement to the State, when located near the Capital, represent the money invested? Would not the improvement and prestige gained by the State, in having and owning a high-class permanent exposition, add far more to the wealth of the State, than the paltry sum of two hundred thousand dollars which is asked for?

But let us look into this cost to the State a little farther. This two hundred thousand dollar appropriation would not be thrown away or given away; but according to the bill now before the Legislature, would be put into the hands of a wise State Fair Commission, to be invested in real estate, for the upbuilding and development of a public enterprise, which in a few years will be self-supporting, and will be returning to the State a nice dividend on the investment. I will venture to say that in ten years from the establishment of the proposed Commission, all of the original appropriation will revert to the State Treasury. If states with less resources, and less industries, and farther down in the rank of agriculture, can make such state fairs self-supporting (which they are doing), why cannot Pennsylvania, with all its industrial wealth, and ranking fifth in the Union in Agriculture, not only make a high-class State Fair self-supporting, but in addition, turn over to the State a handsome dividend? What is two hundred thousand dollars, when asked for in the interest of the encouragement and development of our agri-

culture? Not much. It would not seem much if asked for for any other purpose. Why, I have known the Legislature to appropriate as much as one hundred thousand dollars to a single investigating committee, never expecting that any of it would be returned, either in the form of a dividend, or permanent real estate improvement, much less the development of a State enterprise, and the encouragement and advancement of the first and most important industry of our Commonwealth.

I was one of a number who met the Appropriation Committee of the Legislature, in 1907, in the interest of a State Fair bill, and a member of the Committee asked the question as to whether the agriculture of the State would not be farther advanced by appropriating to the various county fairs the amount which was asked for a State Fair, and as to whether a great State Fair would not prove detrimental to the county fairs. I do not wish to question the intelligence of any member of the Pennsylvania Legislature; this body, with very few exceptions, is composed of broad-minded men, possessing the highest order of intelligence and integrity, but I do not believe that this special member had yet learned that Pennsylvania is an agricultural state; at least, he knew nothing about fairs, or their management. I will now answer these questions: First, if you were to appropriate twenty thousand dollars to each of the county fairs in Pennsylvania, not one of them would have the management, the equipment, or the finances, to put up a modern State Fair, or anything near like it. Second, a State Fair should be permanently equipped to accommodate large displays of all classes of products. It should have large modern barns, and the facilities for housing and caring for large numbers of live stock; it should have large exposition buildings, wherein can be displayed the Arts, Sciences, Mining, Manufacturing Schools, and everything that pertains to the advancement of all the State's varions enterprises. Third, it should have a high-class premium list, which would bring out the best of everything produced in our own state, as well as from all other states and countries, in order that all of our people, representing all of the interest of the State, may come and see of the best advancement and most modern improvement, which only a high-class State Fair can afford. A county fair should be run on a broad and equitable basis, in order that every citizen of the county in which it is held could, and would, become interested; it should have the necessary permanent facilities for housing and showing the best livestock, as well as the best of all the various other products of the county, and it should have a premium list liberal enough to bring out the best of everything produced in the county, which creates that keen competition and enthusiasm which conduced to rapid local development. But, competition should be limited to county products; at least, not open to competition for premiums beyond the borders of the State. I am a strong advocate of county fairs, and they should be shown every possible encouragement by the State, but the county fair, no matter how well managed or equipped, can never take the place of a modern State Fair. As to a great State Fair being detrimental to the county fairs, I answer by saying that it would have the opposite effect; it would be a great object lesson and school for the county fairs, and would be the means of promoting better management,

higher standards, and more uniform and perfect judging of the various products, which would conduce to more perfect and rapid advancement. I have learned, too, that it is a fact that in the states which have good State Fairs, the county fairs are better managed, the judging is more proficient, and they are far in advance of the county fairs in the states where large State Fairs are unknown.

And now, gentlemen, in conclusion, the day is here when it becomes the duty of every citizen to encourage, in the highest possible degree, the development of agriculture in all its branches. Agriculture is the nucleus of our future prosperity. It is the first, the one God-given avocation, upon which depends the prosperity of our State and nation, and all the other industries. Only recently have we begun to encourage agriculture through public or State aid. This State Board of Agriculture, which was the first active State institution in the interest of farming, was not created until 1876; our Department of Agriculture was not instituted until 1895—only about thirteen years ago; our State College and Experiment Station have only recently become an active institution; and we do not yet have a State Fair. And the results which have followed this delinquency are visible in the lack of interest in farming, and the dilapidated condition of large numbers of farms throughout the State, and still more clearly depicted in that picture of "the old folks alone at home on the farm." And where have the strong and proud young farmers gone? They have gone and built your cities, your great railroad systems; the farms have furnished the men who have built up our great manufacturing and commercial interests, to which we point with pride, but the day has dawned in the history of our State, when we, as its citizens, should "raise high the banner of agriculture" by supporting in every possible way these institutions already begun, and by establishing near by our beautiful Capitol a State Fair—an agricultural exposition which will be in harmony with our rank as a State; and to which all industries can point with pride, and which will poise an incentive to greater endeavor; and ere long the brightest of our people from both city and country will return to the farms, and will make agriculture the richest and choicest pearl of our inheritance.

The CHAIRMAN: Is there anything else to be brought before the Board this evening? I hardly think it will be advisable to take up any discussion at this late hour.

It has been customary to appoint a Committee on Resolutions after the organization of the Board. If you think it advisable, I will appoint this Committee now. In many of the reports that have been read, suggestions have been made, and we want to get the sense of the Board in these matters so that the Legislative Committee can go up before our Assembly feeling they have the State Board behind them, and in order that they may feel that there is something tangible behind them, I think it would be well to appoint this Committee on Resolutions at this time.

MR. DORSETT: I move that the Committee be appointed at this time.

This motion was properly seconded and carried in the regular way.

The CHAIRMAN: I will apopint as the Committee on Resolutions: Mr. E. B. Dorsett, Mr. I. A. Eschbach, Mr. S. M. McHenry, Mr. John C. Weller and Mr. H. C. Snavely. Mr. Dorsett being chairman, he can call the committee together at his pleasure.

The SECRETARY: Now, Mr Chairman, it will take only a few minutes for Prof. Surface to show his slides.

At this point Prof. Surface showed the slides which illustrated his report.

The CHAIRMAN: I hope you will all remember that the session tomorrow morning opens at nine o'clock. Some one here suggests that it would be well to remember that nine o'clock comes just sixty minutes after eight, and I might add that it would do no harm to make yourselves believe it comes just seventy-five minutes before ten. Please try to be on time, gentlemen.

On motion, regularly seconded and carried, the meeting adjourned until Wednesday morning.

Wednesday, January 27, 1909, 9 o'clock A. M.

Mr. Hutchison in the Chair.

The CHAIRMAN: The meeting will please come to order. The first thing on the program this morning, is the report of the Chemist, Dr. Frear.

Dr. Frear read the following paper:

THE AGRICULTURAL VALUE OF LIME NITROGEN.

By DR. WM. FREAR, *Chemist.*

In his paper presented to you last year upon the subject of nitric acid manufactured from atmospheric nitrogen, Mr. J. A. Fries mentioned briefly the fact that calcium carbide was able to take up at high temperatures nitrogen gas so as to form a nitrogenous compound. In view of the inquiries that have come to me in the past few months, both from fertilizer manufacturers and others, regarding this material, I have judged that a somewhat fuller account of the manufacture and agricultural uses of the substances of this class might have present interest.

Each discovery increasing the range of control by mankind over the purely physical energies has opened the way to a large development in the number of chemical compounds that can be artificially prepared. This is notably true in the case of the high temperatures attained under conditions well within human control by the use of the electrical furnace, a simple apparatus in which high tension electrical currents are the immediate sources of energy. While diamonds and rubies have been made in the electrical furnace, one of

the most valuable products from this new development of human invention has been calcium carbide, the material which is obtained by the fusion of lime and coke, and which decomposes upon reaction with water so as to form caustic lime and the acetylene gas now so widely used for illuminating purposes.

Further experiment revealed the fact that when calcium carbide is heated with pure nitrogen gas, it gives up some of its carbon and instead takes up nitrogen so as to form calcium cyanamid.

Calcium cyanamid when in pure condition, is a white compound soluble in water. It contains 35 per cent. of nitrogen and, when brought into contact with superheated steam, gives off the nitrogen in the form of ammonia. On treatment with mineral acid, calcium cyanamid forms the calcium salt of the mineral acid and free cyanamid, a compound that by the simple taking up of water, is converted into urea. Furthermore, cyanamid upon recrystallization from cold water solution yields dicyanamid. Both cyanamid and dicyanamid contain 66 per cent. of nitrogen. They are, however, too expensive for present use as fertilizer materials.

The crude calcium cyanamid prepared, as above described, from calcium carbide, contains all the impurities of the latter substance together with the carbon separated from it in the manufacturing processes. The name given to this crude product is "*lime nitrogen*" (in the German, *Kalkstickstoff*). The quantity of nitrogen in this crude product is usually from 15 to 25 per cent. Since calcium carbide is always alkaline because of an excess of lime, lime nitrogen likewise possesses this property. Furthermore, in the production of the carbide, sulfates and phosphates that are always present, though in very small quantity, in the limestone, are reduced to the condition of sulfides and phosphides. These compounds liberate, upon contact with moisture, the gases, sulfuretted and phosporetted hydrogen. There is usually present also more or less unchanged calcium carbide, but not usually enough to make possible the setting free of dangerous quantities of acetylene gas, and the insurance companies have placed lime nitrogen in the list of products not injured by fire. In order to secure the preservation in the fullest measure of the valuable properties of lime nitrogen, and also to prevent the emission of undesirable odors, the manufacturers coat the exterior portions of the bagged goods with heavy petroleum.

The manufacture of this material is now carried on by two different processes, one the Frank and Caro process, requiring a high tension current of electricity for the last stage of the process; the other, the Polenziusz process requiring only that the carbide be heated in nitrogen gas to a temperature between 700 and 800 degrees C. The Polenziusz process differs from the former also in that instead of using lime, calcium chlorid is employed. The former material is now manufactured chiefly in Northern Italy where numerous waterfalls afford cheap electric power. A lease has been taken for operation in the United States under the Frank & Caro patent and the estimates of the industrial engineer for the lessees require an expenditure of not more than 10 cents for each pound of nitrogen contained in the manufactured product. His estimates do not include selling costs, but if they are correctly founded in fact, it would appear that lime nitrogen may very shortly become an article of prime importance in the fertilizer trade.

The commercial article holds most of its nitrogen in a water-soluble form. When applied to plants, it exhibits fertilizing properties. It is not, however, established that plants can take up the lime nitrogen directly, but the experiments of Loehnis and Ashby show that some, possibly many, soil bacteria possess the power of converting the calcium cyanamid into an ammonium compound, so that lime nitrogen affords a source of ammonia that is accompanied not by acids undesirable in excess, but by lime, the substance especially needed in acid soils.

Within the past four years, hundreds of experiments have been made in Europe to ascertain the fertilizer value of lime nitrogen and of the similar "nitrogen-lime" (the name "*Stickstoffkalk*" has been adopted for the product from the Polenziusz process). The results of these trials may be briefly summarized as follows: Direct contact of lime nitrogen with germinating seeds was usually very injurious, so much so that replanting was in some cases required. Such injurious effect rarely occured, however, when the lime nitrogen had been thoroughly incorporated with the soil ten days or two weeks prior to the seeding. It is not thoroughly established to which or how many of the constituents of lime nitrogen this injury may be attributed. In some cases, where parallel treatments with quantities of caustic lime equal to the amount of free lime nitrogen were used, the injury to germinating plants was the same with the lime treatment as with the lime nitrogen treatment, but in other cases, this equality of effect did not appear. Several months have been proposed for such modification of the lime nitrogen as will insure the absence of sulfides, phosphides and carbides. For the present, it is sufficient to know that by early enough application of the material to the land, its injurious effects upon germinating seeds can be avoided.

Practically all experiments in which it was used as a top dressing, in comparison with nitrate of soda and sulfate of ammonia, show a great inferiority of the lime nitrogen to the other material in the resulting gains of plant production. There is strong evidence that, when applied as a top dressing, the lime nitrogen loses nitrogen, probably in the form of ammonia. Furthermore, when so applied in considerable quantities, it has been found in some instances to seriously injure the crop. For this reason, it offers no present promise as a substitute for the nitrate of soda and the sulfate of ammonia now so widely employed for top dressing purposes.

When, however, we come to compare the productive effects of lime nitrogen thoroughly worked into the soil with those of nitrate of soda and sulfate of ammonia, we find, amid considerable variability of result, a general tendency of the lime nitrogen toward equality with nitrate of soda and superiority over sulfate of ammonia. In many cases indeed, experiments have shown higher yields from lime nitrogen than from the nitrate, where the former was thoroughly incorporated with the soil sometime prior to seeding, and the nitrate was employed in such a manner as to secure its best results; namely, in part as a preliminary application to soil and a part in subsequent top dressings.

It is possible that this material may, instead of being offered upon the market for direct consumption by farmers, fruit growers and

others, be introduced as a component of mixed fertilizers. In this relation, it will probably not be used to supply all of the nitrogen, but like the nitrate and the sulfate, to form a mixture with other materials that will afford to the plant at its different stages of growth a considerable variety of nitrogen supply. It is of interest not only to the manufacturer but also to the consumer of mixed goods in which lime nitrogen has been used, to know what effect this ingredient has had upon the other ingredients of the mixture and also to know how lime nitrogen itself is likely to the affected by them.

Experiments by Dr. Glaser of Baltimore, show that when small quantities of lime nitrogen, such as would be likely to be employed when this material was chosen to supply only a fraction of the nitrogen of the entire mixture, were thoroughly mixed with acid phosphate, considerable heat was involved, the mixture became very dry, and yet the amount of soluble phosphoric acid was unchanged providing the acid phosphate contained, prior to the mixture, a considerable amount of free phosphoric acid. If, however, large quantities of lime nitrogen were mixed with acid phosphate, soluble phosphoric acid was largely reverted, but doubtless to a form still available. If, on standing, the lime nitrogen should give off ammonia, the latter could scarcely escape from an acid fertilizer mixture, but would doubtless be held as ammonium phosphate. If the acid of the phosphate should liberate cyanamid, it would probably not be inferior in fertilizing value and would not be likely to escape in a volatile form from the fertilizer heap or package.

The CHAIRMAN: You have heard this paper of Dr. Frear. What shall be done with it?

MR. BLYHOLDER: I move it be received and placed on file.

This motion was properly seconded, and regularly carried.

MR. McGOWAN: Before opening the discussion, with your permission, Mr. Chairman, and the permission of the Board, I would like to say that we have with us this morning, as representatives of the Farmers' Union of Berks County, the President, Mr. E. M. Zerr, Jacob G. Zerr, Samuel C. Hohl, Garfield Engleman, and Evan S. McGowan. They have the record there of doing some good work, and they would like to get the benefit of our discussions here.

The CHAIRMAN: We welcome these gentlemen, and extend to them the privilege of the floor to take part in our deliberations, but none of them can vote on any vital question. Any other farmers present, representing any other agricultural society? If there are, we would like them to make it known.

Is there any further business? If not, we will proceed with the program. The next subject on the program is the report of the Mineralogist, Prof. Baird Halberstadt. Is he present?

Mr. Halberstadt was in attendance, and presented the following paper:

REPORT OF THE MINERALOGIST.

By PROF. BAIRD HALBERSTADT, *F. G. S., Pottsville, Pa.*

While the reports of the Consulting Specialists are expected to be of a strictly technical nature, a departure from this rule is permissible, if the departure be not too wide and especially so, if it will prevent, even to a slight degree, the senseless waste of money expended annually in prospecting for minerals in localities where none exist in paying quantities, if at all. A professional experience of upwards of twenty-five years in governmental and private capacity, much of which has been in Pennsylvania and adjoining states, convinces me that the amount of money uselessly spent in prospecting is much larger than is generally known, and it is with a view to checking this, if even to a slight degree, that impels me to make this departure from the usual form of report. The work and object of the Department of Agriculture is for the benefit and protection of the farmers of the Commonwealth. To benefit him, by giving him information that will aid him in procuring better results from his labor and to protect his crops and live stock from the ravages of disease and his orchards from destruction through parasites, etc.

Such being the case, should we not protect him from the incursions of human parasites, whose attacks are made not upon his fields and orchards but upon the farmer himself, or more specifically upon his pocket book? It is to be regretted that we can not apply to them some of Prof. Surface's sulfur washes, since these fakirs at times do more material harm to the farmer himself than do the San José Scale to his orchards. Within the brain of many a land owner, whether farmer or not, there lurks a suspicion that beneath his lands there may be a rich deposit of coal or other mineral or, perhaps too, an oil pool or gas area. Certain portions of his property may be mountainous, of no use for farming, in fact to all outward appearances generally worthless, unless perhaps it might contain some mineral deposit or deposits. He can not understand, it seems, why it is barren, for everything has its purpose, and with the aid of some fakir, perhaps, he works himself into the belief that there must be within it, some mineral deposit of value, needing only the application of the pick or drill to expose it, and, perhaps, make himself a millionaire.

It is much easier to build air castles than castles of stone, and there may be no harm in the construction of the former, provided it is not done at the financial loss of the builder. All that is necessary, apparently, to begin the work of building is for the land owner or the fakir to find a few shining yellow flakes of mica, a few nodules of iron pyrites or some bits of black shale or slate which are respectively believed to be indications of great deposits of gold, silver and coal and that these await only development to make the owner a modern Croesus, or at least a rich man. Samples of these are sent to a chemist for assay or analysis. If to an honest one, an honest report is rendered, but if sent to a fakir or unscrupulous one,

the probabilities are that an alluring report is written and duly forwarded.

Now, the unscrupulous fellow, knowing that if he find the merest trace of a valuable mineral in a specimen, he cannot be successfully prosecuted for fraud, if he report that the specimen contains gold, silver or carbon. He then reports that he has found these things and suggests "digging" deeper, as the ore (?) will probably become richer at a greater depth, and that a second assay or analysis should be made. In most instances, the gold and silver, if found, is found in the trouser's pocket of the victim and ultimately finds its way into the pocket of the fake chemist. After digging away for weeks and months and spending money for hired labor, it dawns upon the prospector that his labor is lost, his money is gone and his air castle has been entirely destroyed. Then, perhaps, he consults a reputable professional man and learns from him, that from start to finish, he never had the slightest chance to succeed.

During the progress of the work of the Geological Survey, the attention of its officials was frequently called to reports of the finding of valuable mineral deposits hitherto unknown and unsuspected. Investigations were made and in nearly every case, the reported discoveries were found to be exaggerated and apparently with little or nothing upon which to base such wild conclusions. It became patent that some of our citizens were being deceived, either through lack of technical training in themselves or by worthless advice and schemes of men posing as geologists, mineralogists and chemists, old miners, etc. Two solutions of the problem presented themselves. In some instances, it was learned that inexperienced men, finding black shales or slates, were led to believe that a coal deposit of value was near by and that the presence of this black material was a sure indication of it.

Again, upon finding rocks with mica scales of varying colors adhering to them, they assumed that these occurrences were sure indications of the presence of either gold, silver, or both. In pursuit of these phantoms, they labored hard and long, employed men, and spent money sometimes in large amounts and the only reward for it all was the total failure to find these minerals, or if at all, in such small quantities as to be worthless from a commercial standpoint. On the other hand, it was found that they had employed ignorant or dishonest men, who were supposed to be or rather posed as Mining Experts, Geologists, Mineralogists and Chemists, although they are without either training or experience; or if possessing the necessary professional training, were dishonest. One of two things was certain: they were either ignorant or dishonest and to the latter characterization, probably 90 per cent. of the cases could be attributed.

To convict these fakirs is a difficult matter, for several reasons:

(1) The victims are sensitive, and like men or boys who have been "done up" by shell game men at a country fair, they don't care to hear anything more about it, much less to testify against them in Court. In the words of the street, they know they have been "stung" and fear the ridicule of their neighbors, if it were generally known.

(2) Gold and silver in infinitely small quantities may be found in many rocks, and if 1-10,000 part of a grain of either be found in a specimen, the fakir would escape conviction. Fully cognizant of this fact, the fakir runs but small risk of imprisonment. The only safe way is to consult a competent man and especially an honest one, who will not recommend an assay for gold or silver, at $4.00 each, of a specimen that shows no tangible evidence of containing either, or if any, a quantity so small that it would cost $100 or more to get from it a dollar's worth of gold or silver. Several cases of this sort have been quite recently brought to my attention. In each case, assays were recommended by the fakirs, the cost of which varied from $4.00 to $30.00, but not one of the samples contained either gold, silver or other minerals of any value.

Within a short time, some of the victims of these fakirs have called upon me, bringing with them the alluring letters they have received and the identical specimens upon which these reports were based. It seems almost incomprehensible that any one would resort to such means to extort money.

Among a number of specimens brought to me were:

(1) A piece of micaceous sandstone.
(2) A nodule of iron pyrites.

Neither of these possessed any material value, yet the gentlemen exhibited reports from a man, whose letter heads set forth that he was the Acting Geologist, Mineralogist and Chemist of a great Commonwealth. Upon the first specimen, he reported that it contained both gold and silver and recommended an assay of it to be made, at a cost of $4.00, "if made by him."

For the second sample, he recommended an assay for gold and silver and a test of radium; the former to cost $4.00, while a qualitative determination of radium would be $5.00 and to ascertain the exact percentage of radium, the cost would be $10.00. A complete qualitative analysis was suggested for which he said the cost would be $28.00. The concluding paragraph was as follows:

"Are you aware that radium-bearing ores have been found in Schuylkill county?"

Had he known the difference between iron pyrites and gold, he would not have reported as he did, unless he purposely attempted to obtain money under false pretences.

A farmer's wife recently came into a city of this Commonwealth, bringing with her a piece of rock with glittering particles clinging to it. In her innocence, she believed it might contain gold, but she did not say so. The same "Expert" (?) examined it under a magnifying glass and announced that he thought it contained gold. The result was that the farmer's wife was defrauded to the amount of $4.00 and the report furnished a week later said, "It is not as rich as we first supposed, but I think if you dig a little deeper, it will show it to be a rich ore." Gentlemen, that specimen was worthless and the farm woman was robbed.

To show the utter worthlessness of the work of some of these men, I give verbatim two reports of analyses of the same pulverized substance which had been thoroughly mixed. The letters transmitting the results are as follows:

"The sample of the pulverized mineral you sent me for analysis as to silica, I find to contain that constituent (Si O2) 75.876 per cent."

The result being questioned, a second anaylsis was ordered to be made; one week later, the result of the second analysis was transmitted in the following letter:

"In accordance to your request to make another analysis of the substance you gave Mr. ——— in which to determine the silicon, I submit the following result which I claim is the true percentage of that sample which I have in my possession.

Silica, Si O2, 97.74 per cent., or
Silicon Si, 45.96 per cent.

There we have a difference of nearly 22 per cent. of silica in the same sample. One or the other analysis is worthless and shows that the work done in that laboratory can not be relied upon, for no such difference was possible, had the analyses been properly made.

In these days, when our educational advantages are so good, magazines so cheap and economic science is so well understood, it seems almost incomprehensible that so much prospecting is done that is not only wasteful but likewise senseless. Large sums, in the aggregate, are year after year, absolutely wasted in a vain search for mineral wealth. Gold, silver, coal and oil are sought in areas where there is not the slightest chance of obtaining them in commercial quantities. While there is some excuse for the layman, there is absolutely none for the inexperienced persons, who claim to be geologists, etc. That such should be allowed to deceive the people is unfortunate.

A few examples of some senseless prospecting will be given, in order that a better understanding of the situation can be had. Some of these, I am sorry to say, occurred in our own county (Schuylkill). How far the farmers were influenced by so-called "Experts" I am unable to say, but I am sure that some of the work was not undertaken before a so-called expert, old miner or oil man advised it.

For five years, perhaps, interruptedly, some farmers and others have been making a vain search for a workable bed of coal near Auburn. The formation in which they are digging and blasting is the lower part of the Hamilton, known as the Marcellus Shale. There is not the slightest chance to obtain a coal bed that can be worked in this formation but, notwithstanding this fact, of which they have been informed, they are spasmodically working away. I am told that $4,000 in time, labor and explosives have been wasted here.

Let me give another: In one of the eastern townships of the same county, some land owners sunk an oil well, at the suggestion of some one who was either ignorant of the geology of oil or wanted the job to drill the well. If any oil ever existed in that locality, it has long since volatilized and escaped, since the rocks are on a heavy dip and outcrop; that is, in this case the ends of the strata are exposed or but slightly covered. It is useless to drill for oil in Pennsylvania, where such structure is found. Now, about all these people have learned is something about the color and character of the rocks penetrated and how foolishly they have parted with their hard earned dollars. By going a few miles westward, they could have learned more about the rocks than they did through drilling the well.

Still another example: In one of the western townships of the same county, a company has been formed to mine coal in the Pocono Sandstone formation or the False Coal Measures. The result of this operation will be disastrous to those who put their time and money into it, for no beds of coal of commercial value have ever been or ever will be found in this formation in Pennsylvania.

The Marcellus Shale and the Pocono Sandstone are favorite localities for the prospecting for coal in this State, but although many thousand dollars have been expended in work on them, no coal beds of value have ever been found in these formations in Pennsylvania, or is there any probability of ever finding one. No competent geologist could possibly fail to identify these formations, but to the uninitiated, the Pocono, because of its resemblance to the True Coal Measure formation, might readily be mistaken. Some years ago, I was called to Lebanon county to examine a property. Carbonaceous matter had been found. A few moment's examination was sufficient to determine the formation (Utica Slate) and the Carbonaceous matter was very probably of animal origin. Of course, no coal bed existed there, yet the owner had spent quite a sum of money to develop his find.

Gold, Silver and Metal Ores.

As a general proposition, it may be safely stated that in 90 per cent. of the cases, gold, silver and most of the metallic ores are found, when found at all, in the igneous, metamorphic or older sedimentary formations, hence any attempt to find these ores in paying quantities in the later sedimentary rocks will probably result in failure and loss of the amount invested.

There is a mineral, sulphide of iron, which is frequently mistaken by laymen for gold. It is found in nearly all of the formations, sometimes as flakes, again as nodules. It is of a bright brassy yellow color and is extremely hard. It occurs in various forms but usually in the form of a cubic. It will, when struck with steel, throw off sparks and will turn a knife edge when cutting is attempted. It is brittle and, therefore, it can not, like gold, be beaten out into flat sheets. When heated, it gives off a sulphur odor. If these tests be applied to it, it can be readily distinguished from gold. In gold districts, it sometimes carries a good percentage, but where usually found, there is just sufficient gold in it to save a fakir from conviction for fraud, when he reports that it contains gold.

An idea, it seems, is prevalent that mountains unfit for farming or other purposes, contain valuable mineral deposits. The idea is seemingly based upon the saying, "Everything was put here for a purpose" and, because the purpose of the mountains is unexplained or not understood, it is at once assumed that it contains valuable mineral deposits. Such an explanation is worthless, for while it might contain minerals, it does not follow that, because it is not fit for farming, it contains a valuable mineral deposit. Some very alluring reports have been printed in relation to this and other things, but it is believed that, if some of the ridiculous suggestions were put into practice, they would be found to be not only unprofitable but impractical.

The day has not yet arrived when peat will be used to take the place of coal in Pennsylvania, neither is it likely that Ferro-silicon

can be extracted profitably, if at all, from the low grade ores found in the otherwise barren mountains of Pennsylvania. Certainly not for many years to come. Some schemes originate in the brains of men who are honest but lack technical training; others are merely gotten up to defraud.

There are several formations other than the coal measures in Pennsylvania, wherein carbonaceous matter has been found in greater quantity than in others and to these consideration will be given. First, however, it would be better to insert the names assigned to the several formations found in this State, for from such a table, a better knowledge can be obtained of the relative position of each in the series:

PERIOD.	EPOCH.	COLOR AND CHARACTER OF FORMATION.
QUARTERNARY, ...	Quarternary, ...	Glacial drift—Peat and alluvium.
TRIASSIC, ...	Triassic, ...	Dark reddish-brown sandstone—upper beds, coarse conglomerate.
PERMO-CARBONIFEROUS,	Greene Co. Group, ...	Limestones, gray shales, sandstones and thin coal beds.
	Washington Co. Group.	
CARBONIFEROUS, ...	Monongahela River Series,	Sandstones, shales, limestones and coal beds—Pittsburg bed at base.
	Conemaugh Series, ...	Red and green shales, sandstones, sporadic coal beds.
	Allegheny River Series, ...	Shales, sandstones, coal beds, limestones, iron ores.
	Pottsville Series, ...	Conglomerate sandstones, shales and coal beds.
SUB-CARBONIFEROUS, ...	Mauch Chunk Red Shale,..	Soft red shales, clayey red sandstones, slates, shale.
	Pocono Gray Sandstone, ...	Sandstone, olive gray—False coal measures.
DEVONIAN, ...	Catskill Red Sandstone, ...	Red sandstones and red shales.
	Chemung, ...	Sandstone—brownish, olive.
	Portage, ...	Shales and flagstones.
	Genessee, ...	Shales—black.
	Hamilton, ...	Shales—bluish gray, weathering to brownish.
	Marcellus, ...	Shales—black, weathering to brown.
	Upper Helderberg, ...	Limestone, blue—sparry and chert nodules.
	Oriskany, ...	Sandstone—yellowish white, crumbles into pure sand.
	Lower Helderberg, ...	Limestone (clayey-flaggy), varying shades of blue.
UPPER SILURIAN, ...	Salina, Upper, Middle, Lower.	Red shale, limestones (Salt Group).
	Niagara, ...	Perhaps wanting in Pennsylvania.
	Clinton, ...	Slates, shales, sandstones, iron ore.
	Medina, ...	Red and gray sandstones.
	Oneida, ...	Greenish-gray sandstone (conglomerate beds).
LOWER SILURIAN, ...	Hudson River, ...	Dark blue (carbonaceous) shale and slate.
	Utica, ...	Dark (carbonaceous) slate.
	Trenton, ...	Limestone, yellowish-gray.
	Calciferous, ...	Dark yellow-brown.
	Potsdam, ...	Coarse, hard sandstone, friable sandstone — quartzite — fine white glass sand. Colors brown, gray and yellow.
	Azoic.	

It will be observed that the formations containing the cabonaceous matter, beginning at the lowest, are:

The Utica Slates.
The Marcellus Shales.
The Genessee Shales.
The Catskill Red Sandstone (occasional streaks).
Pocono Sandstone—False Coal Measures—(Coal beds unworkable).
Pottsville Series. True Coal Masures.
Allegheny River Series.
Conemaugh Series.
Monongahela River Series.
Washington County Group. Permo-Carboniferous.
Greene County Group.
Triassic, New Red Sandstone.

The only formation in Pennsylvania, containing coal beds of commercial value, is the Carboniferous, and it is useless to prospect for coal in any of the other formations. Notwithstanding the warnings which have been repeatedly sounded for fifty years or more, attempts have been made and are being made to obtain workable coals in the Utica Slate, Marcellus Shales, Genessee Slate, the Catskill, the Pocono or False Coal Measures and Triassic formations. Many hundred openings have been made and many thousand dollars expended, yet all have resulted alike, in absolute failure to find commercial coal beds within them.

While beds of coal have been found in Virginia and North Carolina in the Pocono and Triassic formations, and have been worked there with more or less success, it is due more to the geological position of the fields and their remoteness from the true Carboniferous fields, than to the value of the coal beds themselves.

The questions are often asked: "Why are there no workable beds in Pennsylvania outside of the limits of the Carboniferous, and is it not possible that there may be beds as yet undiscovered?" Answers to these are not hard to give:

(1) At no time during these periods, was the vegetation sufficiently luxuriant to supply the material necessary to produce a bed of commercial value, and it was not until the time of the Carboniferous period that it was so.

(2) In Eastern and Central Pennsylvania, the rock formations are frequently exposed to view from the highest to the lowest, along rivers and streams, and being often highly inclined or on heavy dips, it is possible to carefully examine them; while west of the Allegheny Mountains, thousands and thousands of drill holes sunk in search of Petroleum and Natural Gas, have failed to show the existence of such beds.

Search for Petroleum.

Another favorite scheme worked by the fakirs is the oil discoveries.

While more or less uncertainty always exists as to the presence of oil even on the horizons of the well known oil sands, it is infinitely more doubtful where certain structural conditions exist. In so far as Pennsylvania is concerned, no oil or gas has ever been found where the rocks are on heavy dips, bringing up the oil sand horizons today, and the reason is not hard to determine. Where the gas sands and enclosing rocks come to the surface, the gases have long since escaped and the oil has volatilized and escaped as a gas, if either ever existed. In localities where there is much folding and uplifting in the rock formations, I know of no oil in commercial quantities that was ever found in Pennsylvania east of the Allegheny Mountains.

Briefly summed up, it is apparently useless to drill for oil or gas where the rocks are on heavy pitches. A company of men a year or two ago, sunk a well to a considerable depth in a vain search for oil in West Penn township of Schuylkill county. Although an order for the first barrel of petroleum, at any price, was entered, I have learned that it has never yet been shipped.

The rocks in that vicinity are highly inclined and the sinking of that well was but an exhibition of folly. They never have gotten or never will get, even if they sink the hole deeper, either oil or gas in commercial quantities. The man or men, who advised the land owners there to sink a well for oil, were ignorant of the first principles of geology or else were crooks or sharpers.

I was called upon some years ago by a party of men, who for upwards of a year and a half had been blasting out rock in the Marcellus Shales near Auburn, Schuylkill county, in hopes of finding a bed of coal. They had sunk a rock slope in the Marcellus Shale, expecting with each blast to find a large bed of coal exposed. The search was, of course, fruitless and any reputable geologist could have told them that there was no coal bed to be found. These men, I told very plainly, that all they had spent was lost and to go ahead was merely to throw good money after bad, and had they consulted, before beginning work, a competent, honest geologist, he could have told them just what they found out after months of hard work and the expenditure of much money for explosives and labor.

Like every other profession or calling, that of the geologist numbers, unfortunately, some dishonest men, and as no law forbids it, a number of untrained and uneducated men, claiming themseves as such, and in some instances, through ignorance or design, commit blunders which are a disgrace to a most honorable and beloved calling, and the honorable members of it suffer to some extent through the rascality of the fakirs. These fellows are almost as dangerous to the Commonwealth as the San José Scale is to the farmer.

The CHAIRMAN: You have heard the report of the Mineralogist; what is your pleasure?

MR. BLYHOLDER: I move it be received and placed on file.

This motion was properly seconded, and regularly carried.

The CHAIRMAN: The two reports we have just heard will be open for discussion a little later. Prof. Surface, the Ornithologist, will now present his report.

REPORT OF THE ORNITHOLOGIST.

By PROF. H. A. SURFACE, *Ornithologist.*

I take pleasure in submitting herewith the report of the Ornithologist for the year 1908.

The year 1908, while not unusual, has seen some interesting occurrences in the Bird World. Chief among these have been observations concerning the evil effects of the bird known as the English Sparrow or House Sparrow. It becomes more and more apparent that the act known as the Barnhart Bill, introduced into the last session of the Legislature, providing for the investigation

and practical experiments for destroying this pest, was a good act, and should have received favorable consideration. In this country we do not advocate passing sentence without trial, neither should we proceed with the extermination of any kind of creature without careful investigation as to its habits and economic value. We hope to see such a bill given consideration this session of the Legislature, and we therefore recommend favorable action thereon.

Among the various reports concerning the sparrow is one from W. H. Thomson, Greene street, Harrisburg, Pa., who reports that he saw the sparrows cut off the cherry blossoms in his yard, a single bird cutting off at least a dozen of these within two minutes, and letting them fall to the ground, not appearing to eat them, nor to make use of them. We have reports from other persons of these pests eating green peas in gardens, and the shoots of many kinds of plants, just as they have pushed above the ground.

We have additional reports of the successful poisoning of the English Sparrow by the use of a few very small poisoned seeds mixed with those not poisoned. It appears that this bird is very suspicious, and in eating seeds as large as grains of wheat or larger, it tastes them carefully before swallowing, and any unusual taste becomes sufficient to warn the bird of danger, and it does not partake readily of large seeds thus treated. However, our correspondents inform us that they had succeeded in poisoning them by soaking grains or seeds of millet or other fine seeds in a solution of strychnine, then drying them and mixing one part of this poisoned millet seed with ten parts of unpoisoned seeds of the same kind, and putting them on a roof where the sparrows would find them and eat them, but where the poultry would not be poisoned. Results were that the sparrows ate the small poisoned seeds readily and were killed in great numbers.

Another correspondent recommends a kind of trap, which he has found successful, and which consists of a wire covered box with a tunnel-like boarded entrance leading thereto. We have never known traps to be very efficient when used against this bird, as it is too wary to be caught where it has seen its companions captured or injured.

The solution of the English Sparrow problem may in part be found in educating our people to the realization that the English Sparrow is as good food for the table as the Reed Bird, or any other small bird. In fact, it is possible that many birds offered as Reed Birds in restaurants and hotels are English Sparrows, but the use of these birds for food has not become sufficiently extensive. Excellent suggestions in this regard are made by Rev. Charles Dadant and Son in their Fifth Edition of "Langstroth on the Hive and Honey-Bee" as follows:

"The bee-keepers of England complain of the sparrows, which they accuse of eating bees. If these birds add this mischief to so many others of which they are guilty, the bee-keepers should find some means of getting rid of them. In the Vosges (France) most of the farmers suspend earthen pots to the walls of their barns in which the sparrows make their nests. These jug-shaped pots are examined every week and the young birds are killed as soon as they are ready to fly out, and are put into the frying pan. We have

seen as many as five or six dozen pots on the same wall, nearly all filled with nests, for sparrows raise many broods every year.

"In Italy the consumption of these birds is carried on, on a large scale. Not only are the churches riddled with thousands of holes, in which the sparrows make their nests, but there are at the road crossings, high square towers, which are built for this purpose. An overseer has them locked; he climbs inside and clips the wings of the young, to compel them to stay until they are full grown.

"During the Franco-Italian war against Austria, the French soldiers bought the young sparrows, which they found delicious eating. If the sparrows destroy our bees, can we not destroy them? It is better to eat than to be eaten!

"If—as in the olden time of fables—birds could be moved by human language, it would be worth while to post up, in the vicinity of our Apiaries, the old Greek poet's address to the swallow:

"Attic maiden, honey fad,
Chirping warbler bears't away
Thou the busy buzzing bee,
To thy callow brood a prey?
Warbler, thou a warbler sieze?
Winged, one with lovely wings?
Guest thyself, by summer brought,
Yellow guests whom summer brings?
Wilt not quickly let it drop?
'Tis not fair; indeed, 'tis wrong,
That the ceaseless warbler should
Die by mouth of ceaseless song."

In conclusion we further quote from Rev. Dadant:

"No Apiarist ought to ever encourage the destruction of any birds, except the too-plentiful sparrows because of their fondness for bees. Unless we can check the custom of destroying, on any pretense, our insectivorous birds, we shall soon, not only be deprived of their actual melody among the leafy branches, but shall lament more and more, the increase of insects from whose ravages nothing but these birds can protect us. Let those who can enjoy no music made by these winged choristers of the skies, except that of their agonizing screams as they fall before their heartless gaze, drive away as far as they please from their cruel premises, all the little birds that they cannot destroy, and they will eventually reap the fruits of their folly, when the caterpillars weave their destroying webs over their leafless trees, and insects of all kinds riot in glee on their blasted harvests."

Specimens Received.

A study of the list of birds received by the State Zoologist during the past year indicates fairly well the attention that is being given this subject by observers in this State, and shows the kinds of birds and specimens that come under their notice, but it must not be forgotten that the kinds which are not protected by law would naturally be in much greater abundance in this list of specimens sent dead, as the protected species would not be killed for this purpose, but such would be sent as were found dead, or could legally be taken. This list is as follows:

Short-eared Owl, one; American Sparrow Hawk, one; Western Horned Owl, one; Great Horned Owl, four; Red-tailed Hawk, three;

Blue Jay, two; Screech Owl, one; Sharp-shinned Hawk, one; Flicker, one; Crow, four; Slate-colored Junco, one; American Goshawk, two; American Robin, three; Purple Finch, one; Cooper's Hawk, one; Sora Rail, one; Black-billed Cuckoo, one; Red-eyed Vireo, one; Woodcock, one; Cedar Wax-wing, one; Turkey Vulture, one; Horned Lark, one; Hooded Merganser, one; English Sparrow, two; Wood Thrush, one; Whippoorwill, one; Myrtle Warbler, one; Pigeon Hawk, one; Bluebird, one; Pine Warbler, one; Hairy Woodpecker, one; Northern Shrike, one; White-throated Sparrow, one; Wilson Snipe, one.

This shows, as would be expected, that greater attention has been given to hawks and owls because they are conspicuous and carnivorous, and are generally supposed to be not protected by law in this State.

Planting for Birds.

We have recommended the preservation of birds by various means, among which is planting certain kinds of shrubs, trees and bushes to furnish them their natural food, with a view of producing natural fruits throughout the year. It is observed that the birds prefer the native fruits to the cultivated, and this is one of the best means of preserving our cultivated plants from their ravages. The list, given in order of fruiting, is as follows:

Soft, sweet early varieties of strawberries,
Service berry, or June berry,
Cherry,
Governor Wood and common Black Mayard.
Mulberry, White or Russian, and Black and common,
Raspberry,
Buckberry,
Huckleberry,
Blueberry,
Bayberry,
Pokeberry,
Elderberry,
Hawthorne,
Buckthorn,
Verburnum,
Frost Grape,
Fox Grape,
Wild Grape,
Green Brier,
Bittersweet,
Burning Bush,
Cedar,
Juniper,
Holly,
Gum tree,
Barberry,
Spice Bush,
Hackberry,
English Ivy,
5-leaved Climbing Ivy (Virginia Creeper).

Publications.

We regret to find it necessary to announce the suspension of the valuable magazine on birds and similar subjects which was illustrated by color process and issued good colored illustrations of our native birds. This was entitled "Birds and All Nature," and was published in Chicago.

Our Zoological Bulletin for February, 1908, was on "Birds and Nesting Boxes," and another is soon to be issued on the Purple Martin.

From the United States Department of Agriculture, Bulletins have been published giving results of research on the food of native birds, emphasizing the value of such birds as our native Sparrows and Doves as destroyers of weed seeds, and the warblers and other tree-top birds as insectivorous.

Legislation.

We note with gratification that the Game Commission proposes to strike Columbæ (which includes the Dove and Wild Pigeon) from the list of game birds, putting them on the permanently protected list. This is a good move, and should be supported by our Board, but at the same time we regret that they will make an effort to remove from the protected list the Eagle, the Osprey, the Blue Heron, and the Bittern. Eagles are not sufficiently numerous in this country to be a source of menace to agricultural interests nor to the property of mankind in any great manner. The Osprey is likewise rare, and a graceful, beautiful bird. The Blue Herron has also become rare, and while it feeds mostly on fishes of inferior variety, such as minnows and suckers, and sometimes on the smaller kinds of frogs, we have also seen it devour gophers and similar rodents, which are very destructive. The Bittern feeds only on aquatic material, taking mostly the inferior fishes, mollusks, aquatic insects, and occasionally frogs. The frogs eaten by such birds, however, are mostly the small and useless varieties, and the removal of these from along our streams would doubtless result only in leaving a better food supply for the Bull-frog (Rana catesbiana), which is about the only one worthy of the attention of epicures and frog collectors.

Another bird that should be placed on the protected list is the Quail, and I would ask the respectful consideration of the following Resolution by the several committees of this Board:

"Whereas, the Quail, sometimes known as the "Bob White" is known to be a most valuable bird on the farm, for its destruction of weed seeds and insect pests.

"Therefore, Be It Resolved: That we request legislation providing for re-stocking this State with Quail, and protecting this bird by all possible means for a period of at least five years."

A closed season for at least five years would do much toward increasing this most valuable bird.

It is the opinion of the Ornithologist that our efforts should be to protect and preserve more rather than fewer of our birds, and for this reason we shall regret seeing these creatures destroyed, and recommend legal measures for their preservation.

The CHAIRMAN: You have heard the report. What is your pleasure?

MR. STOUT: I move it be received and filed.

This motion was properly seconded and regularly carried.

The CHAIRMAN: Next in order is the report of the Committee on Fertilizers. Is Mr. Sexton in the room?

Mr. Sexton's report was as follows:

REPORT OF COMMITTEE ON FERTILIZERS.

By JASON SEXTON, *Chairman.*

The term "Fertilizer" is so broad in its meaning that it would seem to include all substances that tend to increase the fertility of our lands, in fact, it means so much when applied to agriculture, one would need to travel over the old countries of Europe and study the methods used there, where not a pound of any substance that has any fertilizing value in it, is allowed to go to waste, and where after hundreds of years of crop growing and constant tillage they know of no such thing as worn-out lands, nor of conditions such as exist in this country—but where, under their system of heavy cropping, the farmers are constantly improving their lands, which is done by a system of economy whereby they return to the soil all that has been extracted from it after it has served its purposes to sustain and feed both the human family and their domestic animals. In this country we make up for our careless and wasteful methods by purchasing expensive commercial fertilizers for which as farmers we created a demand so great, that shrewd business men have invested hundreds of thousands of dollars in extensive plants and mills, and are employing many shipmasters to scour the world to bring to their mills cargoes of material to be mixed and ground to feed the crops grown by the American farmer, while many ignore and let go to waste, much of the material we might utilize, and that can be found at our own doors. As American farmers we spend our millions annually for food for our crops, which should in a large measure be manufactured and produced on the farm at very much less expense. The trouble is, as is often said of us American farmers, we are always trying to save at the spigot while we are constantly losing at the bung. Many of us buy expensive commercial fertilizers without thought or study, while we allow piles of manure from our stables to remain to bleach for months in uncovered yards and the valuable liquid manure to run off down some stream or gutter instead of hauling it at once from the stable to the land where so much needed, and where nature has provided a way to use it where it will do the greatest good. But we must take up conditions as they exist, and drop all others, and direct our attention to the discussion of the question of Commercial Fertilizers, the use of which has grown to enormous proportions during the past few

years. The estimate of what the farmers of Pennsylvania are paying annually for Commercial Fertilizers as given by Mr. Schwarz in his very excellent report of last year, which I have his permission to quote, is from five to seven million of dollars, an enormous sum, and it certainly proves that no other industry could stand such a drain upon its resources and still leave a fair profit for its managers. No doubt one-half of this vast sum is expended by farmers who do not make a study of the requirements of the crops they wish to grow, but make a haphazard purchase of the number of tons they will need and the amount of money needed to pay for it, and the time and conditions of payment, and often purchase fertilizers on their high-sounding names, not giving heed to the direct needs of the crops they desire or expect to grow.

But very many of our farmers are becoming expert buyers and will purchase no brand of goods except that needed by the particular crop they expect to grow, and they not only want the true analysis upon the sack to tell them what it contains, but they want something there to tell them from what source the ingredients are derived. We also find that commercial fertilizers are being quite extensively used by the fruit growers of our State, and where intelligently used they have given very satisfactory results. Of course, there is a wide difference of opinion as to the best formula for each particular fruit. The question of what to use and the proportion of the various ingredients, is largely a local question with each grower, depending greatly upon his soil and location. We have heard growers remark that it is practically impossible to find upon the market brands of fertilizer best adapted to the various soils and fruits of our State.

This makes intelligent home mixing quite desirable, as it places the grower in absolute control of the whole question, as he can mix the food to feed the land, as well as the crop, and can actually save several dollars per ton. This home mixing holds good for all other farm crops, each requiring its peculiar feed that the soil does not furnish, leaving that part to the judgment and intelligence of the grower.

Here we desire to say that this home mixing has a decided educational value, which the progressive farmer should not overlook as he prepares his soil and fertilizer for his different crops, and we predict the day is not far distant when more study will be given the requirements of our crops and more home mixing will be done even though it be an unpleasant task.

Our State Department of Agriculture has been greatly aiding the farmers during the years that the manufacturing of fertilizers have been under State control, and that aid has only been limited by the defective laws that were at first enacted, but as better and more comprehensive laws have been enacted for the protection of the farmer in the purchase of fertilizers, the Department has proved itself to be of incalculable value by enforcing them, by the collecting of hundreds of samples of fertilizers all over the State and having them analyzed by the State Chemist to ascertain whether the contents of the sack from which the sample was taken corresponds with what is printed on the outside and thus protecting the purchaser from fraud. The Department should certainly be

commended for its good work during the past year on this line, for it reports the taking of 2,747 samples, gathered from all parts of the State, 1,113 of which were analyzed, the remaining being duplicate samples. There were approximately 5,000 determinations for which were paid a specific rate for each determination, and best of all 13 cases were prosecuted for "deficiency" and fines and costs collected amounting to $344. Five cases were prosecuted for selling without license and fines and costs collected $103.74. There were 1,314 brands licensed by 147 manufactnrers. License fees collected $22,640.00.

In conclusion, we recommend that action be taken by the Department, as there has been no session of the Legislature since the adoption of the report of one year ago, to have enacted into laws the suggestions and recommendations contained in that report as adopted, which reads as follows:

First: Prevent the printing on bag or tag of all but plain minimum figures.

Second: Provide for some statement on bag or tag of the source of ingredients in the fertilizer, or at least for the establishment of some standard of solubility by the use of which the tag can show various degrees.

Third: Provide for an increased penalty for non-compliance with the law. The minimum fine of $25, and possible maximum of $200, does not seem sufficiently severe.

Fourth: Provide that the official analysis made by the State Chemist shall be sufficient legal evidence of the infraction of the law, where such analysis shows less value than the guarantee.

The CHAIRMAN: What shall be done with this report?

On motion, it was received and placed on file.

The CHAIRMAN: Next comes the report of the Meterologists; is Prof. Owens present? No answer. Is Mr. Eshleman here? He does not answer. Now, friends, we have Dr. Hunt on "Soil Fertility" and the election of officers this morning yet. I think, therefore, it would be wise to postpone the discussion of the papers we have just heard until we have heard Dr. Hunt's address.

MR. STOUT: I make that motion.

This motion was properly seconded, and regularly carried.

The SECRETARY: I want to say before Dr. Hunt speaks, that reference has been made several times to the better conditions at State College, and the better facilities for educating young men at the College. Now, I know that Dr. Hunt is entirely too modest to talk about this unless we ask him, but I know that I am voicing the sentiment of the audience in asking him to tell us about these things. I used to know a local preacher who always told his audience, "Bredren, I would like to say a few words before I begin to preach," and I think we would like to have Dr. Hunt speak to us a few minutes before he begins his address, on the conditions and outlook up at State College.

ADDRESS OF DR. HUNT.

Mr. Chairman, and Gentlemen: I hardly know whether it is altogether wise for me to talk to you for ten minutes before I begin to speak, because when a man comes before an audience, he should be prepared, and I have not had time to even consider what I might say regarding the School of Agriculture and Experiment Station at State College, but if I am to tell you of the progress, I believe I can tell it most quickly by giving you figures. Now, I know that figures are dry material, but at the same time it may be the best way to give you an idea of the work which we are doing.

I appeared before this body two years ago, at the kind invitation of Secretary Critchfield, to tell you something of the hopes that we had for the future of the School of Agriculture and Experiment Station up at State College. That was at a time when I was connected in another State, but I have been now a good Pennsylvanian for a year and a half. When I spoke to you two years ago, we had in the School of Agriculture 202 students; now we have 325; two years ago we had 23 Freshmen; last year we had 51, and this year we have registered over 100 Freshmen. Now, we have made one record that we are proud of, and we are doing all the bragging about it that we can, because we don't expect to repeat it, and I don't believe any other institution will ever do it again, so we are doing all the talking about it that we can. Last year we had 50 Freshmen; this year we have 52 Sophomores; last year we had 20 Sophomores; this year we have 26 Juniors; last year we had 15 Juniors; this year we have 15 Seniors. We did not have to cut them up in two the way Watts does with his plants, to make two. Some one asked whether we cut them up. We have more in each class than we had in the class before. We not only retained the students we had, but got new ones. Of course, there were some students last year who did not return this year; we did not expect them to return; but of the students who did not return there were just five. On account of the hard times we were afraid that many of our students could not return, but they did, and others in addition to them. The figures I have just given show you in a general way what is going on.

The Governor of the State of Pennsylvania was kind enough to come up to State College last September a year ago, to dedicate a new building which cost the State of Pennsylvania nearly $300,000, and yet during the last month there have been days when the students had to stand in the largest room in that building to listen to the lectures; that is an illustration of the way we have outgrown this building, and other buildings. We have, for example, two laboratories there; one has twenty-four chairs in; the other twenty-two. The one is in agricultural chemistry; the other is in soils. We can take care of 44 students in the agricultural laboratory, but we will have in this coming semester no less than 75, and next year at the same time we expect to have at least 100, in a room fitted to take care of 44 students. In the preparation of the plans of this building, which, I take it, was expected to last at least twenty-five years, or one generation,—we have been in it but fourteen months—in the plan of that building 1,300 square feet was allowed for the

Department of Horticulture and Prof. Watts is already planning a new building which shall have at least 13,000 square feet allotted for this purpose, and I believe it is included in the budget for this year; the Legislature will be asked to appropriate $175,000 for this purpose this year.

Now, I was to talk to you ten minutes before I began to speak, and I think the ten minutes are about up, and I had better begin my speech. But there is just one thing that I want to say; those of us who have been working in our little corner up there have been astonnded and gratified at the moral support and backing that has been given us in our efforts to raise the agricultural standards of the State of Pennsylvania. We know that we have received the moral support of the farmers and citizens of Pennsylvania and I feel assured that we will continue to receive it, until our School of Agriculture and Experiment Station are equal to any similar institution in the United States.

Dr. Hunt's paper is as follows:

SOIL FERTILITY.

By DR. THOMAS F. HUNT, *State College, Pa.*

The Pennsylvania Agricultural Experiment Station has the longest continuous series of fertilizer experiments in America. It is my purpose in the forty minutes at our disposal to tell you of the more important results obtained during the first twenty-five years. This plats each in a rotation consisting of corn, oats, wheat and hay. The series of fertilizer experiments was conducted on four tiers of 36 hay was a mixture of timothy and clover. A complete rotation of crops is raised each year; in other words, each year there has been 36 plats of ear corn, corn stover, oat grain, oat straw, wheat grain, wheat straw and hay. During twenty-five years therefore, 6300 separate weights have been taken. This vast accumulation of results covering a quarter of a century of continuous experimentation has been used in arriving at the statements presently to be made. No attempt will be made to discuss the data at length but only to point out the most salient facts. A. D. Hall, refering to the plat experiments of the Rothamstead station in England, which have been in progress sixty or more years, recently stated that had the experiments terminated at the end of forty years they would not have been able to give their present interpretation to the results. With this illustration before us it is not wise to attempt too wide or too positive generalizations from the results of twenty-five years of field experiments.

Before taking up the results of this series of experiments, it may be well to emphasize what all practical farmers know to be true, namely, that the best results and, generally speaking, profitable results can be obtained with fertilizers only when other conditions are favorable. The essentials of plant growth are light, heat, soil moisture, soil air, plant food and the absence of any unfavorable or unhealthy condition of soil, such as too great an acidity of alkalinity

of the soil. If through natural conditions the land is water soaked, thus reducing the temperature and excluding the soil air, the addition of fertilizers can be of no practical value. If from lack of tillage a suitable seed bed is not obtained and proper environment maintained for the roots profitable crops need not be expected. There is nothing plainer than that profitable returns cannot be obtained unless by proper tillage and decaying vegetable matter we maintain suitable conditions for the growth of organisms which add nitrogen in forms available to growing plants. Nitrogen costs eighteen cents a pound in commercial fertilizers. At that price we must depend upon the air for at least a part of the supply for the growth of crops. It is equally true that a rotation of crops is essential in order to prevent the increase of fungous diseases and insect enemies to a point where the crops are seriously injured or even completely destroyed.

The soil on which this series of experiments is being conducted is especially favorable to the best use of plant food. The soil is a silt or clay loam of limestone origin, belonging to that series of soils to which soil experts have given the name of Hagerstown. The heavy soils in the limestone valleys of southeastern Pennsylvania are identical in origin and character to the soil on which these experiments were made.

The natural drainage on the experiment station farm is almost perfect. In digging a well at the college water was struck at 150 feet and a satisfactory supply obtained at 385 feet below the surface. The land has been underlaid by heavy beds of limestone. The gradual dissolving of this limestone material has left underground channels, thus making a ready escape for the surplus water, while the heavy nature of the soil and subsoil cause them to retain sufficient water under existing climatic conditions for the growth of crops.

Not infrequently soils fail to respond to fertilization or cultural methods on account of the lack of lime. The soil and subsoil in the blue grass roadways between the tiers of plats were analyzed during the past year. The soil was found to contain approximately .5 of one per cent. of lime and the subsoil .6 of one per cent. This is something more than twice the amount of lime generally assumed necessary for a good soil. In these experiments 4,000 pounds of burned lime applied to the soil once in four years without any fertilizer has during twenty-five years slightly decreased the yield, while 4,000 pounds of ground limestone applied every alternate year slightly increased the yield. Where 4,000 pounds of quicklime was applied once in four years to a plat which receives six tons of yard manure every alternate year the yield was equal to that from the plat receiving ten tons of yard manure without lime. In other words, lime without manure decreased the yield, lime with manure increased the yield. This is a lesson that every land owner should learn.

For over a third of a century the College has had the same farm superintendent. When the lecturers of our college were babies, or at least very young children, Mr. Patterson was associating his name with that high type of farming to which we have given the name "Patterson Farming," which means doing the right thing at the right time. The methods of cultivation, seeding and harvesting

have been under his immediate care during the whole of the experiment. It is needless to say that all operations have been performed as uniformly as possible for all plats, in order that any variation of yield might not be due to differences in cultivation, seeding or harvesting.

As before stated, each year a complete rotation of crops is grown on the four tiers. Fertilizers are applied on alternate years, namely, to the corn and wheat. No fertilizer has ever been applied to the oats or the grass, any increase in yield in these crops being due to the application made to the corn or wheat. In these experiments which deal with the maintenance of soil fertility the most important question is not the influence of a given fertilizer on a given crop, but the total result obtained during a rotation or a series of rotations. The results will be presented, therefore, by rotation periods of four years. The weights or values given will be the total weight or total value of the seven farm products obtained during one year on the four tiers of plats. In computing values the following prices have been used—corn, 50c; oats, 32c; and wheat, 80c per bushel. Corn stover, oat straw and wheat straw, $2.50 per ton, and hay $10 per ton. The values placed upon the grains are approximately the average December farm prices in Pennsylvania during the decade ending December 1, 1906.

COMPARATIVE EFFECT OF SINGLE FERTILIZER INGREDIENTS.

In all discussion on the influence of the effect of different fertilizer ingredients, it must be borne in mind that the results were obtained in a rotation in which nitrogen was added to the soil from the nodule producing bacteria of clover as well as by other soil bacteria. Where single fertilizer ingredients have been applied the effect has been to add to the soil the particular ingredient, plus nitrogen. Where nitrogen was the ingredient applied the effect has been merely to increase that ingredient. In reality, therefore, the nitrogen plats are the only ones in which a single ingredient has been applied. Keeping this in mind, the effect of an application of phosphoric acid, potash and nitrogen when applied singly is shown in the table for twenty-five four years' rotation.

Single Fertilizer Ingredients.

Average value of products from twenty-five four years' rotations, Pennsylvania Experiment Station, State College.

Alternate Years.	Lb.	Value.
None,		$63 03
Phosphoric acid,	48	71 70
Potash,	100	60 16
Nitrogen,	24	58 84

The application of potash and nitrogen singly has had no material effect upon the yield. The actual yields have been slightly less upon the plats where potash or nitrogen have been applied singly than upon the average of the five untreated plats. It is probable, however, that the differences are within the limits of natural soil variation.

Phosphoric acid, when applied singly, has had a distinct influence in maintaining the crop producing power of the soil. The influence of phosphoric acid in keping up the crop producing power is best understood by a comparison with the untreated plats by five year periods. During the first five years, while the land was in a good state of fertility, no material influence was produced by adding phosphoric acid. During the next five years there was a slight increase in yield where phosphoric acid was applied. During the last three five year periods the increase in yield on plats receiving phosphoric acid was marked compared with the untreated plats. While the average yields during the twenty-five years on the series of plats treated with phosphoric acid was fourteen per cent. greater than on the untreated plats during the last five years the increase was thirty-one per cent.

COMPARATIVE EFFECT OF COMPLETE AND INCOMPLETE FERTILIZERS HAVING COMPARED THE INFLUENCE OF SINGLE INGREDIENTS.

Having compared the influence of single ingredients, the next step will be to compare the effect of two ingredients. This table shows the average value of the products from twenty-five four year rotations where two ingredients were used, in comparison with the untreated plats and the plats receiving a complete fertilizer consisting of phosphoric acid 48 pounds, potash 100 pounds and nitrogen 24 pounds per acre.

Two Fertilizer Ingredients.

Alternate years.	Value.
None,	$63 03
P and K,	84 51
P and N,	80 40
N and K,	64 31
P, K and N,	91 11

Average value of products from twenty-five four years' rotations, Pennsylvania Experiment Station.

The most striking fact brought out by this table is that the application of 48 pounds of phosphoric acid and 100 pounds of potash applied in alternate years to a rotation consisting of corn, oats, wheat and mixed hay (timothy and clover), namely, to the corn and wheat has, during twenty-five years, maintained the crop producing power of the soil.

There is no evidence thus far to show but what the supply of nitrogen can be indefinitely maintained on this limestone soil by means of a rotation containing clover, provided phosphoric acid and potash are abundantly supplied. The addition of 24 pounds of nitrogen to the mineral fertilizers has, however, resulted in a material increase in yield. It will be noted from the table that on plats receiving no fertilizer the average value of products from twenty-five four years' rotations was $63.03, where phosphoric acid and potash was applied $84.51, and where 24 pounds of nitrogen was added to the mineral fertilizers, $91.11.

It is interesting to note that when potash was applied alone no increase resulted. When, however, potash was applied with phosphoric acid a material increase resulted over the application of the

phosphoric acid alone. In like manner when nitrogen was applied with phosphoric acid or potash or with both increased yields resulted, but in less marked degree, owing to bacterial agencies supplying nitrogen. Although not without exception there has been a slight tendency for the nitrogen when applied with phosphoric acid or with both phosphoric acid and potash to increase the grain at the expense of the straw or forage.

COMPARATIVE EFFECT OF DIFFERENT FORMS OF NITROGEN.

Nitrogen was applied to different plats in three different forms, namely, as dried blood, nitrate of soda and sulphate of ammonia. It was applied in three different amounts, 24, 48 and 72 pounds per acre respectively.

The following table gives the average value of the products from twenty-five years' rotations when nitrogen was applied in the different form and different amounts indicated in the table in connection with phosphoric acid and potash, the latter always being applied in the same amounts.

DIFFERENT FORMS AND AMOUNTS OF NITROGEN.

Alternate Years.	Twenty-four pounds.	Forty-eight pounds.	Seventy-two pounds.
Dried blood,	$85 10	$90 47	$92 79
Nitrate of soda,	91 11	93 37	94 22
Sulphate of ammonia,	88 65	90 99	84 45

The analysis of this table shows clearly that nitrate of soda has, almost without exception, given better results than either dried blood or sulphate of ammonia. It will be noted that sulphate of ammonia in the largest amount has given the poorest result. During the first ten years of the experiment the plats thus treated gave the highest yields, but since that time the injurious effect of the sulphate of ammonia when applied continuously in large amounts has become very marked. Special investigations have shown that the lime requirements of plats treated with sulphate of ammonia is very much greater than those treated with nitrate of soda. The injurious effect of this acid condition of the soil due to the continuous use of sulphate of ammonia has been more marked upon the corn and the clover than upon the wheat, oats or timothy.

COMMERCIAL FERTILIZERS IN COMPARISON WITH STABLE MANURE.

It has been possible during twenty-five years to maintain the crop producing capacity of this soil without the use of any stable manure. When the yields of the three plats of each tier receiving 24, 48 and 72 pounds of nitrogen in connection with 48 pounds of phos-

phoric acid and 100 pounds of potash are averaged and compared with four plats receiving six tons (two plats), eight tons and ten tons of yard manure, it is found that the yield has been slightly greater where commercial fertilizers have been used for every five year period except one, as shown in the chart.

Without the addition of any organic matter to the soil during twenty-five years, except the roots and stubble of the crops raised, the fertility of the soil has been fully maintained. The table shows the average value of the products twenty-five four-year rotations, the cost of two applications of fertilizer and the value of the increase during the rotation over the cost of the fertilizer.

COMMERCIAL FERTILIZERS vs. YARD MANURE.

Alternate Years.	Value.	Cost of fertilizer.	Increase less cost.
None,	$63 03		
P,	71 79	$4 80	$3 96
P and K,	84 51	12 80	8 68
P, K and N,	91 11	21 44	6 64
Yard manure, six tons,	88 99	*12 00	13 96

*Estimated at one dollar per ton.

Average value of products from 25 four years' rotations, Pennsylvania Experiment Station, State College.

In making this comparison an arbitrary value of $1 per ton has been placed upon the stable manure. In estimating the cost of commercial fertilizers, phosphoric acid has been valued at five cents a pound, potash at four cents a pound, and nitrogen at eighteen cents a pound. Assuming these values to be correct, the best commercial returns have been made by the use of yard manure, the next best by the use of phosphoric acid and potash together, next a complete fertilizer containing 24 pounds of nitrogen per acre, and fourth by the use of phosphoric acid alone. The amount of potash used has been somewhat excessive and it is believed that probably equally good results would have been obtained by a less amount, perhaps half the amount of potash. If this is true, then relatively better results would be indicated from the use of phosphoric acid and potash or by the use of a complete commercial fertilizer containing potash.

EFFECT OF LIGHT APPLICATIONS OF YARD MANURE.

Comparatively light applications of yard manure applied on alternate years, namely, to the corn and the wheat, have produced marked increase in yield compared with plats receiving no fertilizer of any kind. This table emphasizes the importance of light applications of yard manure when applied as frequently as once in two years. The same facts are brought out in the table showing values of four years' rotations by five year periods. The first column shows

the plats which received no fertilizer. It will be noted that there has been a decrease from $75 for the average of the first five years to approximately $50, while where six tons of yard manure has been applied in alternate years the value of the products of a four years rotation for the first five years was $87, as compared to nearly $92 the last five year period.

LIGHT APPLICATION OF YARD MANURE.

	No treatment.	Yard manure, six tons.	Yard manure, eight tons.	Yard manure, ten tons.
1882-6,	$75 35	$87 03	$87 01	$85 56
1887-91,	75 46	91 67	90 56	90 30
1892-6,	64 29	91 46	90 64	92 75
1896-01,	49 16	83 07	85 93	90 54
1902-6,	50 88	91 73	93 95	100 67
1882-1906,	$63 03	$88 99	$89 62	$91 91

Showing the value of products from plats on all four tiers where yard manure was applied as compared with plats receiving no fertilizer during twenty-five years.

It will be noted further that the returns from the plat receiving ten tons of yard manure during the last five year period was almost exactly double that of the plats receiving no treatment. The application of twelve tons of yard manure has caused an annual increase valued at $25.96, or a return of $2.16 for each ton of manure applied. The application of sixteen tons has caused an increase of $26.61 or $1.66 per ton, while twenty tons has caused an increase of $28.88, or $1.44 per ton. These values were obtained from four acres raising four different crops during one year. In other words, if 100 acres of land had been in a four years' rotation consisting of corn, oats, wheat and hay, and one-half the land, namely, that which was in corn and wheat, had each year been treated with six tons of yard manure per acre, with the results obtained in this experiment the increased annual value of the products on the 100 acres would not have been $2,596, but one-fourth that amount, or $649.00. This is not a "get rich quick" proposition, but is a very satisfactory annual increase from 100 acres of land.

Generally speaking, economic farm management in Pennsylvania calls for the use of yard manure supplemented by commercial fertilizers. Every farm will have its individual problems and hence no advice can be given which will be of general application. The experiments conducted at the station during the past twenty-five years suggest that on a limestone soil, assuming a five years rotation, consisting of corn, oats, wheat each one year, and timothy and clover two years, the following will be an economic method of fertilizing if maintained during a series of years. For the corn apply six tons of manure per acre. For the oats apply no fertilizers except

when beginning to build up the soil, in which case 150 pounds of acid phosphate may be applied. For the wheat apply 350 pounds of acid phosphate and 100 pounds of muriate of potash. No fertilizer need be applied to the grass land for the first crop, for the second crop apply during the previous summer or fall six tons of yard manure per acre, and if yard manure is not available apply in the spring just as the grass begins to start 150 pounds of nitrate of soda, 150 pounds of acid phosphate and 50 pounds of muriate of potash per acre. This twenty-five years' test indicates that the best results can be obtained only by a continuous and systematic use of fertilizers in connection with a well ordered method of cropping.

A Member: How do you apply the manure?

DR. HUNT: Plow it in.

MRS. BETTS: When?

DR. HUNT: In the spring, to be plowed in in the winter or fall, a very short time before the corn was planted. It was prepared for wheat in the month of August.

The CHAIRMAN: We have all enjoyed this excellent talk very much, and I am only sorry we cannot give more time to its discussion, but there is a pressure of other business at this time.

MR. HERR: May I present the credentials of Dr. M. E. Conard, of Chester county?

The CHAIRMAN: What shall be done with these credentials?

The SECRETARY: I move they be received.

This motion was properly seconded, and carried in the regular way.

The CHAIRMAN: I have been requested to announce a meeting of the Dairymen over in the Board of Trade Room. You are all welcome to stay with us, but from now on we will have election of officers this morning, and some of you may prefer to go over there to hear the discussions going on there. We are much obliged to you all for your presence here this morning.

The SECRETARY: Just a minute, before we proceed with the election of officers, I will call the roll again to see whether any of the absentees or tardy members have since come in.

(The result of this roll-call is included in the list of members in attendance.)

MR. DORSETT: Before we proceed with the election, I would like to announce that I would like the Committee on Resolutions to meet me immediately after the session.

The CHAIRMAN: We will now proceed with the election of officers. The first to be elected are three Vice-Presidents. I am now ready to receive the nominations.

MR. SNAVELY: I nominate Mr. Herr.

A Member: I nominate Mr. McHenry.

A Member: I nominate Mr. Sexton.

MR. DORSETT: I move the nominations be closed and the Secretary cast the ballot.

This motion was properly seconded, and carried in the regular way.

The SECRETARY: In accordance with these instructions, I take pleasure in casting the ballot for Mr. Herr, Mr. McHenry, and Mr. Sexton, as Vice-Presidents in the order named.

The CHAIRMAN: Seven gentlemen are now to be elected as an Executive Committee for the year.

MR. SNAVELY: I nominate Mr. Fenstermaker.

MR. FENSTERMAKER: I nominate Mr. Snavely.

MR. HERR: I nominate Elisha Davis, of Clearfield.

MR. FENSTERMAKER: I nominate Mr. Howard McGowan, of Berks.

MR. SEXTON: I nominate W. H. Stout.

MR. STOUT: I nominate Mr. A. J. Kahler.

A Member: I nominate Mr. M. M. Naginey.

MR. DORSETT: I move the nominations be closed, and the Secretary cast the ballot for the gentlemen named.

This motion was properly seconded, and carried in the regular way.

The SECRETARY: Following the instructions of the Board, I cast the vote for the following gentlemen as members of the Executive Committee for the coming year: Messrs. Fenstermaker, Snavely, Davis, McGowan, Stout, Kahler, and Naginey.

The CHAIRMAN: The Advisory Committee, is that elected or appointed?

The SECRETARY: That is appointed by the Executive Committee, which also appoints the Consulting Specialists.

The CHAIRMAN: Is there any other business now for the Board to present?

PROF. MENGES: My report will be ready for you this afternoon or this evening, whenever you are ready for it. I could not get here yesterday at the time I was put on the program; I was doing Institute work up in Monroe county, and could not get through in time to get here.

MR. HERR: There is still another member to be elected on the Executive Committee; there are eight members to be elected, who, together with the Secretary, form the nine members of the Executive Committee. I therefore move that Mr. H. M. Gooderham be elected a member of this Committee, and the Secretary cast the ballot.

This motion was properly seconded, and regularly carried.

The SECRETARY: I take pleasure in casting the ballot for Mr. H. M. Gooderham as the additional member of the Executive Committee.

The SECRETARY: We have been in the habit of giving notice to the Governor of the Commonwealth that we are in session. This is a time that he is very busy; the Legislature is in session, but possibly it might be well to appoint a Committee to wait on him and invite him to come in and spend whatever time he may be able to spare, with us.

MR. HERR: I move that a Committee of three be appointed to wait upon the Governor.

This motion was properly seconded, and carried in the regular way.

The CHAIRMAN: I will appoint that Committee before we adjourn this morning. The next in order is to decide where the spring meeting shall be held.

MR. NAGINEY: I move that we take up the subject of a place for the Spring meeting.

This motion was properly seconded, and carried in the regular way.

The CHAIRMAN: I shall be pleased to receive nominations for a place to hold the Spring meeting.

MR. BARNES: In behalf of one of the greatest counties in the State, I wish to nominate the city of York. We have a number of first-class hotels; a court house not exceeded by any in Pennsylvania; first-class railroad facilities, and, altogether, it is a delightful place for the meeting.

PROF. MENGES: May I say something right here, now, on the subject? I am not entitled to a vote on this question, but I want to second that motion of having the meeting come to York. I have gone around among the hotels in York—I knew that would strike the right cord among these fellows over here—and I have gotten their permission to invite you. Now, how do you like that?

The SECRETARY: What do they want to do with us when we come?

PROF. MENGES: We'll show you all right. Now, as Mr. McGowan, here, has my letter, he will probably read it. I have also gotten permission to use the Court House. Mr. Barnes has already stated what kind of a Court House we have down there. It cost over $40,000.

A Member: How about the jail?

PROF. MENGES: We are one of the richest farming counties in the State, our people take great pride and interest in the Farmers' Institutes, and they are anxious to have you meet with us. I therefore extend you a most cordial invitation to come to York in the Spring.

The CHAIRMAN: You have heard the invitation to the city of York, gentlemen; are there any other places?

MR. McGOWAN: I have the letters Mr. Menges speaks of, urgently requesting us to meet in York, and the hotels offer us a special rate of $1.50 to $2.00 a day, should we decide to meet there in May.

MR. STOUT. I move the nominations be closed.

This motion was properly seconded, and carried in the regular way.

The CHAIRMAN: Have you anything to say, Mr. Martin?

DIRECTOR MARTIN: Nothing, except to express my appreciation of the hospitality of the people of York in opening their hotels to us at reduced rates. York is easy of access by rail throughout the State. As in all the former years past, we never have a preference; in every county in the State we find suitable places to hold our round-up meeting; and how could we make a preference? Our interest lies all over the State. So far as I am concerned, York will receive my heartiest support.

The SECRETARY: I hope that all the members of the Board will take their cue from this hereafter, and ask the hotels, before asking for the meeting to come to their places—not. as has been the custom, ask the meeting, and then the hotels. We have learned something, even if it is from York.

The CHAIRMAN: I have stopped at three different hotels there, and they are all good, and it is a beautiful section of country. The next place of meeting, therefore, will be at York, at the call of the Secretary and Deputy Secretary.

I will appoint the following committee to wait on the Governor: Mr. Herr:

MR. HERR: I made the motion, therefore I ask to be excused.

The CHAIRMAN: I presume we will have to excuse you, then, Brother Herr. In place of Mr. Herr I will appoint Mr. Blyholder; Mr. Stout ——

MR. STOUT: I beg to be excused.

The CHAIRMAN: What's the matter with you fellows? Well, in place of Mr. Stout, I will name Mr. Dorsett, and, as a third member —I believe we usually have three, do we not?—I will appoint Mr. Glover.

MR. FENSTERMAKER: I would like to have the Executive Committee meet me here at one o'clock promptly, to make the appointments for the coming year.

The CHAIRMAN: Now, friends, we have quite a good program, so try to come out this afternoon. If the Governor should come we want as good an attendance as possible.

MR. HERR: I want to present the report of the Memorial Committee.

This report was as follows:

REPORT OF MEMORIAL COMMITTEE.

WHEREAS: This Board has learned of the death of Col. Charles H. Mullin, senior member of this State Board of Agriculture, who departed this life January 13, 1909: who was admitted to membership in the Board in 1878, and held the position consecutively until his death, therefore,

BE IT RESOLVED: That the Board expresses its regret at his demise after his long-continued membership on the Board, and extends its sympathies to his bereaved family:

RESOLVED: That these Resolutions be spread upon the Minutes of this meeting, and a copy sent to his family.

(Signed) J. A. HERR,
W. H. STOUT,
M. M. NAGINEY,
A. P. YOUNG,
S. M. McHENRY.

The CHAIRMAN: You have all heard the reading of this report. What is your pleasure in the matter?

MR. BLYHOLDER: I move it be adopted by a rising vote.

This motion was properly seconded, and regularly carried, and the motion was adopted by a rising vote.

MR. STOUT: I move we adjourn.

The CHAIRMAN: I want to thank you for the honor you have conferred upon me in electing me Vice-President during the last year. I love this Board; some years ago we thought it was going to die, but we have taken on new life, and I hope our meetings in the future will be as profitable as they have been in the past. I trust you will extend the same courtesy and friendly co-operation to my successors as you have done to me. Once more, I thank you.

The motion of Mr. Stout having been seconded, and carried in the regular way, the meeting adjourned until 1.30 P. M.

Wednesday, January 27, 1909, 1.30 P. M.

Mr. Herr in the Chair.

The CHAIRMAN: The meeting will please come to order. There is a full program before us, and we have no time to waste.

MR. BLYHOLDER: As Chairman of the Committee appointed to wait on the Governor, we beg to report that we will be unable to report definitely whether he can be with us or not, until three o'clock.

The CHAIRMAN: The first thing is the report of the Executive Committee. No response; that is inexcusable; that committee should be here. We will proceed with the reports of Specialists. First, is the report on Forests and Forestry, by Robert S. Conklin. Mr. Conklin is unable to be present, but his deputy, Mr. Williams, is here, and will give us the report. I take pleasure in introducing Mr. Williams.

REPORT ON FORESTS AND FORESTRY.

By I. C. WILLIAMS, ESQ., *Deputy Commissioner of Forestry.*

During the year 1908, just passed, the work of Forestry has been going on in its usual even tenor. We are paying particular attention at this time to protection against fires. As you know, on account of the drouth, the year 1908 has been an unusually destructive year in the matter of forest fires. It is gratifying to be able to report to you that but a small percentage of these fires was on State lands, and we believe that this is due to the better protection that we were able to throw about them. This is accomplished by men who devote their whole time to the protection of the reserves. A forester from the Academy is in charge of each reserve, and the general management is directly in his charge. The rangers are subordinate to the forester, and they make their reports to him daily or weekly. We hope in time to have a system of telephones all over the reserves, whereby they can report every night. The forester's office will be in communication with the main office at Harrisburg, and by these means the Department will be able to keep its finger on every part of the State's reserves at all times.

During the last year purchases have been made generally throughout the State. The last Legislature generously gave us the full limit in the way of appropriations, $600,000 for two years. The Governor lopped off $100,000, leaving us $500,000, which will be ample for present operations.

I have brought with me a map which shows the State Reserves exactly as they appeared January 1, 1909, and with your permission, I will refer to it. As you will see, a large part of the reserve lies in the Susquehanna River basin, and extends northeastwardly and southwestwardly across the central portion of the State. The scale of this map is six miles to the inch, so you will be able to get some concrete notion of the size of the different reserves. To date, the State has purchased 861,919 acres of land. During the year 1908, State paid for 107,508 acres. The average price paid for this land is somewhat less than $2.25 per acre. Some of it was bought for considerably less money, and for some we have paid more. The law fixes the limit at $5.00 per acre; beyond that we are not permitted to go. In very few cases was the full price paid, and then only for small interior portions, of which it was desirable to gain possession. Only one large area was purchased at that price. The following is a list of the holdings of the State to date, January 28, 1909:

County.	Acres.	Perches.
Adams,	12,170	189.6
Bedford,	9,935	88
Cameron,	74,576	148.54
Centre,	75,463	10
Clearfield,	50,587	120
Clinton,	108,476	55
Cumberland,	2,852	81
Dauphin,	3,353	93
Elk,	8,263	.....
Franklin,	39,530	54.5
Fulton,	6,189	25
Huntingdon,	54,184	159
Juniata,	1,909	16
Lackawanna,	2,853	147
Lycoming,	69,116	15.35
Mifflin,	55,492	95.9
Monroe,	6,171	51
Perry,	17,683	136.3
Pike,	53,210	75.9
Potter,	91,587	86.6
Snyder,	17,219	120
Tioga,	49,758	78.8
Union,	50,154	152.6
Wyoming,	1,176	144
	861,919	3.09

You will notice one other fact in connection with this map; that the State at this time owns no land in the drainage basin of the Ohio River. It is very important that reserves be acquired in the western portion of the State where the denudation is greater than anywhere else. The reason for this is that at present the State will purchase land only in fee simple, and in the western part of the State this is not yet possible because of the soft coal and gas interests. I have no doubt that in time we will have to take these lands, buying the surface rights only and allowing the coal and gas leases to remain. The same forest effects may be secured by the purchase of the surface rights, leaving the coal and gas ownership where they now are.

During this year the Department has paid a great deal of attention to its Forest Nurseries. The first of our nurseries was at Mont Alto. This has now been increased to seven acres, and we find excellent results. It was soon found that one nursery could not supply the demands made upon it, so a second one was started at Greenwood, Huntingdon county, and a third at Asaph, in Tioga county. At Greenwood, there are five acres, and at Asaph, twenty acres, so that we have over thirty acres of forest nursery trees to be planted on the forest reserves of the State. There are places where tree cutting has been so close, or damage by fire so serious, that there is no tree life left in the soil. The trees will not reprodnce themselves from the stumps, which have been so thoroughly burned that they have no power of reproduction left within themselves. Two years ago the Forestry Department seriously considered, thoroughly discnssed, and then approved the proposition that the State For

estry Department should grow seedling trees for distribution at cost price to farmers who would agree to plant and care for them. We are receiving inquiries right along from persons who wish to grow forest trees on any vacant space they may have. The Department as yet has no legal authority to do this work. There are many men engaged in the business of growing forest seedlings, but they are mostly in the Western States, so the Commission decided to see whether this could not be done in Pennsylvania to be followed by distributing trees at cost to farmers and others who will agree to grow and care for them, plus, of course, the cost of transportation to the place to which they are to be sent. This would be a very small item, and we believe it will be possible in this way to raise the percentage of forest lands in every county of the State. One pound of pine seed contains 30,000 grains, and if they have about 90 per cent. germinating power, as is generally figured, that one pound of seed will produce at least 25,000 young trees. As I say, this project was seriously considered and approved by the Forestry Commission two years ago, but at that time, we were not raising enough to supply the demands from our own reserves, so the bill was not considered at that session; but at this session it will come up, and any of you who are interested in this subject of forest trees can help us by using your influence with the Legislature in behalf of this bill. If I mistake not, it has already been introduced, and it will no doubt follow the regular course of bills. The proposition was first considered whether it would not be wise to raise these seedlings and give them away to farmers and others who would take care of them, but the Commission seems to realize the fact that what you get for nothing does not amount to much. If the price be fixed at the actual cost of raising the seedlings plus transportation, it would still be within reach of all who are interested, and make it of more value to them.

MR. HUTCHISON: What are these trees worth, Mr. Williams, say, these little pine trees?

MR. WILLIAMS: About a dollar a thousand, or less.

MR. FENSTERMAKER: What age and size?

MR. WILLIAMS: The best age is three years. At the age of three years they are from four to six inches high. If you plant a larger sized tree you are likely to have a larger percentage of failures. The coniferous trees are peculiar in this respect: The sap of the tree is resinous, and if the roots become dry, or partly dry, the tree will not grow, because the resinous sap when once dry will never be dissolved again. Consequently, we take them when the roots are small, and when they may be taken out of the ground with less effort and when they can be handled with less danger from drying out. They must be kept uniformly moist until they are placed into their permanent positions. Other trees, hard wood, or broad leaved trees, may be planted up to the age of four or five years, or even much older.

MR. COWAN: How do you treat trees that come up without planting?

MR. WILLIAMS: When they came up it is well to let them stand on that land, if possible.

MR. COWAN: Where there are too many of them?

MR. WILLIAMS: Take some of them out. Now, the young pine trees we raise in the nursery are planted in rows from four to five feet apart, or about that, so that the tree has about twenty-five square feet in which to grow and spread.

MR. HERR: In taking it out to plant again, you can use a much larger tree?

MR. WILLIAMS: Yes.

MRS. BETTS: When transplanting it, can you still keep it moist?

MR. WILLIAMS: If it is properly covered, the roots are likely to keep sufficiently moist.

MRS. BETTS: Can you plant it with a mulch around it?

MR. WILLIAMS: The coniferous trees do not respond to that treatment very rapidly. The best way is to plant them in mineral soil, pack them, and leave the soil a little loose on the top.

MR. FENSTERMAKER: As between the White Pine, the Yellow Pine and the Scotch Pine, which is the best for Pennsylvania?

MR. WILLIAMS: White Pine and Yellow Pine; the Scotch Pine does not take kindly to our soil and conditions here, although it is exactly the thing for Europe. The White Pine is first; then the Yellow Pine.

MR. McHENRY: Do you prune the roots of the coniferous tree?

MR. WILLIAMS: Always plant it with as large a root as possible keeping the root moist.

MR. McHENRY: Does that apply to forest trees?

MR. WILLIAMS: Yes; they all do better with larger roots.

MR. McHENRY: How about broad-leaved trees?

MR. WILLIAMS: Broad-leaved trees are all planted of a larger size.

MRS. BETTS: Will it hurt them to cut the root off short?

MR. WILLIAMS: Not always; sometimes it may do so; it may recover from the injury, but it takes time.

MRS. BETTS: I had some roots that had been injured, and I found it best to eradicate them entirely.

MR. WILLIAMS: If your tree is thrifty, it may recover from the injury.

MRS. BETTS: Mine never recovered.

MR. COWAN: What about trees that are growing naturally, and are weeded out too much to prune those that are left?

MR. WILLIAMS: The main idea in growing forest trees is to grow the tree as straight as you can get it; therefore it is not a good thing to prune out the interior growth so as to let in the sun. In pruning it is wise to keep the canopy close. In other words, have the branches of the trees nearly in contact. This will keep the ground moist. Now with these white pine trees that are planted at intervals of five feet, we find their branches will shortly come together; this is allowed for the time being. The result is that the trees are hindered in their lateral growth, and reach up into the air and sunlight. By these means the forest gets height. Side branches may then be pruned. After the trees have reached a certain stage of height growth, the forester goes through and cuts out every second tree. This increases diameter growth. For the first few feet of stem you will have clear timber, and that is what the forester aims to produce.

MR. COWAN: We do not plant trees in our district; they grow naturally.

MR. WILLIAMS: In planting the White Pine, we take the little trees, such as I have told you about, usually not more than four or five inches high. First the rows are laid off at the proper distances. We get the distances for one side of the field, then cords are drawn with knots or other marks upon them. Now, we have the rows fixed. The first man goes along with his mattock, and at the marked distances strikes a hole as deep as he can with one blow. It is his endeavor to plant the tree with one stroke. The hole is struck perpendicularly, then with a short turn of the blade he draws the mattock out with one clean-cut movement towards him. This leaves a hole perpendicular on one side, and sloping on the other. The young trees are taken to the field in bundles of twenty-five or a hundred. Before they are labeled and carried away, the man in charge of the nursery immerses them in liquid mud. The roots are thoroughly covered with liquid mud. The trees are then closely packed together into a box. This prevents the sun and air from drying them out, for there is little or no evaporation. Now, the second man comes along with a bundle of these plants in his hand. He selects one, places the roots against the perpendicular side of the hole, the house being deep enough so that they may not touch bottom. With one hand he holds it in place, and with the other hand he packs the earth against it. With one motion of the hand he will pack enough earth around it, and as he rises, places one foot against the plant, forcing the earth down hard and tight.

The CHAIRMAN: I would like to say that we have a very full program for this afternoon, and every one whose name is on the program should be here to report at the proper time. The Executive Committee was not here to respond when it was called upon. Is that Committe ready to report now?

MR. FENSTERMAKER: The Committee was in session at the time it was called for.

The CHAIRMAN: I make this announcement for the benefit of everybody. We will proceed with the next number—the report of the Committee on Cereals and Cereal Crops, by Mr. J. Newton Glover.

Mr. Glover's report was as follows:

REPORT OF COMMITTEE ON CEREALS AND CEREAL CROPS.

By J. NEWTON GLOVER, *Chairman.*

The year 1908 was a good one for the farmers of this State in the yields of crops and prices received for them. The latter part of seeding time in 1907 was one of continued wet weather, which delayed seeding of wheat and rye to such an extent that many acres were seeded late and under unfavorable conditions, which resulted in a poor stand of these grains for the winter. But wheat and rye sown in the first half of September made a good growth, and snow covered grain fields during most of the winter, which was a great protection, especially to the late seedings. The spring of 1908 was cold and wet, yet favorable for wheat and rye growth, so that late seedings improved wonderfully and early seedings as well, with just enough rain when in blossom, to make a crop of good, plump grain, which was over-weight on early seedings and a yield above the average, while the late seedings made over half a crop. The yield of straw was good and straight, as wheat stood up well, and was a pleasure to harvest. Most of the wheat has been sold at one dollar, and rye at seventy-five cents, though much of this grain is fed to stock on farms. The summer and fall of 1908 were unusually dry, so that plowing for wheat seeding and harrowing were done under unfavorable conditions. Where plowing of wheat or oats stubbles was done early, harrowed and packed with the roller, to conserve moisture, a nice seed-bed was secured and wheat and rye seeded on such soil germinated readily and a good stand was secured. But clay, and low black soils, plowed later, turned up very cloddy, and no rain falling as expected, such soils could not be gotten in proper condition for a good seed-bed, resulting in a thinner stand of winter grain than usual, and many rough-looking wheat fields which do not promise well for 1909.

The importance of properly cleaning and grading seed wheat to rid fields of cockle and cheat and get a good stand of strong plants, needs to be emphasized, so as to raise the average yield of the State more than 2.1 bushels the next decade.

Where farmers were unable to seed oats during the early part of April, continued wet weather later on delayed oats seeding in low fields till the latter part of April or early May, resulting in smaller yields of light weight oats and less straw. Hard storms and showers when oats were nearly ripe caused considerable loss of grain, and made harvesting this crop difficult, and the straw not so desirable for feed or bedding, as it would have been. This crop varied in

yield from 25 to 50 bushels per acre, in different part of the State, and also in quality. The market price for oats so far has been fifty cents per bushel.

The corn crop of 1907 did not mature properly, and much corn moulded in the crib, but farmers tried to, and did secure, seed corn which under favorable weather conditions for germination produced a good stand of corn. Enough rain fell in showers during earing time to make a good yield of solid corn, above the average yield, with plenty of fine stover, and an unusually big growth of rag weeds and fall grass in corn fields which had been "laid by early." Selection and care of seed corn are receiving greater attention by corn growers, and seed testing along with them, will help to eliminate the nubbin and increase the yield. White seed corn failed in germinating last spring, in a number of cases, and farmers who grew such corn for a quarter of a century, had to use yellow corn for planting, because it had cured or matured better in 1907; though more bushels of white corn can be grown per acre, usually. Many carloads of corn have been sold on the ear at 60c for 70 pounds, and yellow corn is preferred.

Buckwheat was a good crop, and sold at its usual price.

A cool, wet spring is favorable for grass, as well as winter grains, and the good stand of timothy and clovers on the meadows last spring made a splendid hay crop, especially of clover, which was thick on the ground, made fine hay instead of coarse stems, as is the case under favorable growing conditions, with a thinner stand. Weather conditions were favorable during haying, so the crop was easily cured and housed, though the yield was larger than for several years. Alsike clover, seeded with medium red, is being sown more each year, as farmers learn to know its value for pasture and for fine sweet-smelling hay.

Second growth of clover was very good, but the heads were not so well filled with seed as in 1907, but the grains were nicer and plumper this year (1908), though the yield was only from one-half to one and one-half bushels per acre, and the price only half as high as last year. Clover seed sown last spring made a good growth, but the hot, dry weather after harvest killed some of it.

Failure of clover to fill some years and need of pasture, compels many farmers to buy all their timothy and clover seeds, and has brought many foul and troublesome weeds on farms, among which are wild carrot, thistles, buckthorn, ox-eye daisy, and dodder. Persons buying grass seed should be protected against loss and annoyance by such, and other weed seeds.

Alfalfa has been tried in a small way on many farms with different results, but experience has taught us that this useful plant will grow on properly drained, limed, fertilized, and prepared soils, without any bacteria, if all the conditions are favorable for its growth, and it is hoped that many acres of it may be grown in this State for its feeding and fertilizing value.

Since clovers are one great source of fertility, and fertility is the chief thing on a farm, let us grow more clovers to get more fertility in one of the natural ways.

The CHAIRMAN: Gentlemen, you have heard the report of the Committee on Cereals and Cereal Crops; what shall be done with the report?

MR. COWAN: I move it be received and placed on file.

This motion was properly seconded and carried in the regnlar way.

MR. FENSTERMAKER: The Executive Committee is ready to report.

MR. DORSETT: I would like to ask that any persons who have Resolutions to hand to the Committee, do so between now and three o'clock.

The CHAIRMAN: We will now have the report of the Executive Committee.

MR. FENSTERMAKER: In order to facilitate the work of the Board, it has been deemed advisable to make a few changes in the list of Consulting Specialists; not because of any fanlt in their work; simply to relieve some of them from over-work. The following is the list as presented by the Execntive Committee.

"Gentlemen: Some changes have been made in the appointment of Specialists of the Board, and Chairmen of the several Standing Committees; not becanse there was any dissatisfaction with the work done by those who have heretofore occnpied the positions, bnt in cases where changes could be made without endangering the efficiency of the service, it was thonght best to make such changes in order to effect a more complete division of labor.

We therefore snbmit for the approval of the board, the following: (See list, page 7).

No appointment was made on Floriculture, and yonr committee thought it best that this subject be dropped from the list.

Respectfnlly submitted,

P. S. FENSTERMAKER, Chairman.
H. C. SNAVELY,
E. M. DAVIS,
H. G. McGOWAN,
W. H. STOUT,
A. J. KAHLER.
M. M. NAGINEY,
H. M. GOODERHAM,
N. B. CRITCHFIELD, Secretary.

The CHAIRMAN: Yon have heard the report of the Committee; what is your pleasure? Does this selection meet with the approval of the Secretary?

SECRETARY CRITCHFIELD: Yes, sir.

On motion, properly seconded, and duly carried in the regular way, this report was accepted.

The CHAIRMAN: Next in order is the report of the Committee on Dairy and Dairy Products; is Mr. Perham here?

Mr. Perham was in attendance at the Dairy Section, but his paper was in, and, on motion, properly seconded, and carried in the regular way, ordered to be published with the proceedings. This paper is as follows:

REPORT OF COMMITTEE ON DAIRY AND DAIRY PRODUCTS.

By W. E. PERHAM, *Chairman.*

The dairymen of Pennsylvania were up against it in 1908. In fact, it will have to go down in history as the hardest year in many for the dairy farmer in some parts of the State. The drought and high prices of feed, with prices of milk and butter fat remaining about parallel with prices of last year, makes this condition. Yet Pennsylvania makes a good showing, even though the dairy farmers have lost money. Of the 23,000,000 cows in the United States, 1,200,000 are in this State, the approximate value of which is $43,000,000. The value of our dairy products alone is over $40,000,000. This is exceeded by only one State—New York.

The largest portion of this product is in butter and cheese. Butter leads, but the production of cheese is on the increase. Especially is this true in the northern and western tiers of counties. There has been an increase in the sale of cream, whole milk, and ice cream, and the prices seem fairly good until compared with the prices of feeds. The tendency of farmers to sell milk is increasing very rapidly, because of the larger returns in cash, but it is a greater drain upon their farms.

The Borden's are getting a strong foot-hold in this State. They are probably doing more to make the farmer produce a clean, wholesome milk than any of the other large milk dealers, and they have always led in price until this winter, when, for some reason, they have cut the price ten cents per hundred. The New York Milk Exchange gives better prices this winter, buying milk at four cents a quart, and they do not restrict the farmer to feeds. The cream trade has also nearly doubled within the last few years. This is without doubt, the most profitable way a dairyman can dispose of his product, as it leaves the skim milk for feeding out upon the farm.

The consumption of oleomargarine, while on the increase, is kept well within the bounds of the dairy and food laws. The output for 1908 was about 79,000,000 pounds, or an increase of about 10,000,000 over 1907.

The average price of butter in 1908 was 27.61c. The low point was in August, when extras dropped to 21¼c. The highest price was in February when 34½c was reached. This is about 1-3c under the average price for 1907. 1907 was the banner year.

But, leaving the dairy conditions of Pennsylvania for a few minutes, I want to speak of a problem for the dairymen everywhere; yes, and it is a problem in which the professional experimenter in dairy husbandry can help us. It is safe to say that of the 23,000,000 cows in the United States, seven-eighths of them are what might

be called the "common cow"—that is, not capable of producing over 150 pounds of butter fat yearly. With a population increasing faster than our dairy products, the question is, how are we to meet this demand for these products? Of course, it will have to be either by increasing the number of cows, or by increasing the amount of butter fat per cow. In other words, shall we try to double the production of our cows, or shall we double the number of cows? Of course, all these common cows cannot be replaced by the special dairy cow, but if there is some way by which the common cow may be made to increase her product by even a half, the saving in feed to a dairyman would help him to withstand to a little advantage this enormous cost of feed. Is there anything we can do to bring this condition about? Something ought to be done, if possible, to relieve this drain on the dairyman. Within a short time, I heard one of the best dairymen say that it was costing him 30 per cent. more to produce milk now than it did three years ago, and yet the price of milk was no higher, and he had simply got to go out of the business, or produce milk at a loss.

The most misleading statistics we have are those concerning agricultural products. The dairy output is estimated at $800,000,000. Some of our great papers illustrate it by having the farmer handing out $100 to every man, woman and child in the United States. Great as it is, the probable cost of the $800,000,000 worth of product was a billion dollars at least. If our papers would figure this out, I think it would bring every man, woman and child in debt to the farmer.

The CHAIRMAN: Next on the program is the report of the Committee on Feeding Stuffs, George G. Hutchison, Chairman.

Mr. Hutchison read the following paper:

REPORT OF COMMITTEE ON FEEDING STUFFS.

By G. G. HUTCHISON, *Chairman.*

As Chairman of your Committee on Feeding Stuffs, I beg leave to make the following report for the year ending December 31st, 1908.

The Legislature of 1907 passed a new Feeding Stuffs Law, and the Governor approved the same on the 28th day of May, 1907, but the law did not go into effect until August 1st, 1907. My last report to you covered five months of the work under the new law. This did not give us very much time to test its workings, and it always takes the citizens of the Commonwealth some time to adjust themselves to the requirements of a new feed or food law. This, we found to be the case in regard to this law, and a good deal of care had to be exercised in enforcing the law. The radical changes that were made between the old law and the present one, were, that it required the manufacturer, jobber or person who sold feed, to place the analysis of the crude fiber on the package, as well as the composition

of the feed. This has been a great benefit to us in enforcing the Feeding Stuffs Law, as the customer could readily tell what the feed was composed of, and if the dealer gave a wrong composition and we secured a sample, we were in a position to have him either correct the statement on the sack or package, or we could bring prosecution.

Another change in the law was that it gave the residents of Pennsylvania a right to send in samples to have them analyzed at $1.00 per sample, and required the Chemist to perform this work in ten days from the date of receiving the sample. It also required the analysis of all official samples within sixty days after the same were received by the Chief Chemist, at the Laboratory. You all should be informed on this law as copies of the same have been mailed to you, and do hope you have taken the time to read the same carefully.

The Superintendent of Public Grounds and Buildings has provided commodious quarters for the State Chemical Laboratory and offices connected therewith, which have been occupied since April 1, 1908. They are situated on the fifth floor of the Capitol Building. The laboratories occupy four rooms and are fitted up with the very best appliances that can be secured for the work. Here the analyses of feeding stuffs are made by the Chief Chemist and his four Assistants. This is a busy workshop. They also analyze Paris Green, Linseed Oil and food samples. I would respectfully invite you all to visit us. I am informed that this is one of the best laboratories in the United States, under a Feeding Stuffs Law.

The field work or securing of samples is done by two Special Agents, who are appointed by the Secretary of Agriculture and are under my direction. These agents have visited each county in the Commonwealth in the last 13 months and have secured the following number of samples in each county:

Name of County.	No. samples taken.	No. towns visited and no samples taken.
Allegheny,	28	16
Armstrong,	24	11
Beaver,	12	7
Bedford,	41	6
Berks,	13	1
Blair,	61	4
Bucks,	25	.....
Butler,	34	7
Cambria,	46	16
Cameron,	6	1
Carbon,	8	.....
Centre,	28	4
Chester,	15	7
Clarion,	10	1
Clearfield,	57	3
Clinton,	28	.....
Columbia,	12	3
Crawford,	26	2

Name of County.	No. samples taken.	No. towns visited and no samples taken.
Cumberland,	2	.....
Dauphin,	31	7
Delaware,	17	.....
Elk,	14	.....
Fayette,	23	11
Erie,	39	.....
Forest,	2	.....
Franklin,	38	1
Greene,	3	.....
Huntingdon,	18	14
Indiana,	35	1
Jefferson,	27	.....
Juniata,	17	3
Lancaster,	7	.....
Lawrence,	11	6
Lebanon,	14	1
Lehigh,	23	4
Luzerne,	.....	1
Lycoming,	42	6
McKean,	26	7
Mercer,	13	9
Mifflin,	26	2
Monroe,	11	3
Montgomery,	27	12
Montour,	4	5
Northampton,	29	2
Northumberland,	35	13
Philadelphia,	27	.....
Perry,	20	4
Potter,	9	.....
Schuylkill,	12	2
Snyder,	3	6
Somerset,	24	10
Sullivan,	4	2
Tioga,	8	.....
Union,	11	9
Warren,	14	.....
Washington,	32	1
Wayne,	18	4
Westmoreland,	66	17
	1,256	152

To section 1 there was added a proviso, as follows:

"That when any manufacturer or purchaser, located within the State of Pennsylvania, of any bran or middlings, or mixture thereof, or of any concentrated commercial feeding stuff, as defined in section two of this Act, shall send samples of the same to the Secretary of Agriculture for analysis, the chemist of the Department shall furnish such analysis, showing the percentage of crude protein, fat and fiber which it contains, and shall charge a fee of $1.00 for each such sample which analysis shall be made within ten days after the sample is received by the chemist, and all moneys so received shall, from time to time, be covered into the State Treasury."

Under this provision there have been received by the Department of Agriculture, and analyzed by the chemist, 535 samples. Reports of the analysis have been furnished to the person or persons who sent in the said samples. This has been the means of giving information to our feed manufacturers, dealers and purchasers, which have been of great value to them. There may be a question arise in your minds why it was necessary to charge a fee of $1.00. This fee is charged so that the Laboratory will not be over-run with this kind of work, as it places a restriction on the number of samples that would be sent in, and persons would send in samples through curiosity and the results would be of no material benefit to them. The fee does not pay for the work performed.

REPORT SHOWING THE COMPARISON OF PURE FEEDS WITH THOSE WHICH ARE ADULTERATED.

During the past year a large number of feeds which have been found for sale on the market in Pennsylvania, have been examined in this Department. They have been analyzed chemically to determine the protein, fat and fiber content, and they have been examined microscopically to find out whether the composition of the feed was as certified, or as a pure feed should be, or whether foreign or inferior products had been added to cheapen them, and thus defraud the consumer and violate the Feeding Stuff Law.

Many of the feeds examined were found to be below the normal and certified composition and to be adulterated with inferior by-products and ingredients which were not only vastly cheaper than the pure article, but which were deficient in feeding value to such an extent that the stock fed on the same would fail to get proper nourishment, and in some instances the health of the animal would be in jeopardy.

It is the purport of this paper to show to what an extent the law is violated and to illustrate the manner in which some of the feeds sold in this State are adulterated.

A few of the principal feeds of average composition have been prepared, together with some of the same found adulterated or cheapened, and also the adulterants as indicated by the accompanying table and samples. It is unnecessary to enter into a lengthy discussion concerning these feeds and their manufacture, as that is well known, but it is of importance that a few inferior articles should be compared with those of standard composition and your attention called to the fact that some goods of inferior quality are for sale in Pennsylvania.

PARTIAL LIST OF FEEDING STUFFS FOUND ON THE MARKETS OF PENNSYLVANIA, INCLUDING ADULTERATED SAMPLES AND THEIR ADULTERANTS.

	Name.	Protein.	Fat.	Fiber.
		Per ct.	Per ct.	Per ct.
1.	Cottonseed Meal,	43.63	10.12	7.29
2.	Cottonseed Meal, adulterated with hulls,	37.66	9.13	11.26
3.	Cottonseed Feed,	11.56	2.59	35.60
4.	Ground Cottonseed Feed,	11.56	2.59	35.60
5.	Cottonseed Hull Bran,	2.63	.37	35.96
6.	Ground Flaxseed,	21.93	38.09	5.19
7.	Linseed Oil Meal, O. P.,	32.25	7.10	8.17
8.	Flax Screenings, sold as flax meal,	15.88	14.03	12.37
9.	Refuse from flax plant, including shives and crushed seeds,	14.25	8.20	27.33
10.	Malt Sprouts,	21.88	7.48	11.31
11.	Sold as brewers' grains, contains malt sprouts and rice hulls,	27.94	6.70	14.70
12.	Gluten Feed, not colored,	26.44	3.43	8.50
13.	Colored Gluten Feed,	11.25	3.28	4.11
14.	Aniline Dye,	.....	.....	.....
15.	Coloring extracted, acid solution,	.....	.....	.....
16.	Woolen Yarn, dyed by acid solution,	.....	.....	.....
17.	Wheat Middlings,	18.00	5.15	5.06
18.	Wheat Middlings, containing weed seeds,	18.88	7.25	6.42
19.	Wheat Middlings, containing corn cobs,	11.25	2.56	11.90
20.	Wheat Middlings, adulterated with corn cobs,	11.35	2.90	12.42
21.	Wheat Bran, alive with beetles,	15.88	4.50	9.22
22.	Wheat Bran,	15.56	4.80	9.02
23.	Mixed Feed, containing wheat bran, middlings and corn cobs,	12.25	3.23	15.68
24.	Ground Corn Cobs,	2.50	.50	30.10
25.	Hominy Feed,	10.00	8.15	4.95
26.	Hominy Feed, containing corn and ground corn cobs,	19.00	6.25	6.97
27.	Corn Bran,	8.50	6.90	9.00
28.	Molasses Feed, adulterated with rice hulls,	12.98	3.47	15.47
29.	Molasses Feed, alive with meal mites, containing cottonseed meal, brewers' grains, screenings, corn, oats and molasses,	16.82	4.32	10.96
30.	Molasses Feed, adulterated with rice hulls, screenings and buckwheat hulls,	9.93	2.32	17.79
31.	Worms and beetles found in molasses feeds, poultry feeds, wheat feeds and chop feeds,	.....	.....	.....
32.	Ground Rice Hulls, an adulterant,	3.60	.70	35.70
33.	Rice Hulls, unground,	3.60	.70	35.70
34.	Wheat Screenings, used in molasses feeds,	15.88	14.03	12.37
35.	Ground Wheat Screenings,	15.88	14.03	12.37
36.	Barley Hulls and Screenings, used in molasses feeds,	10.75	3.70	19.76
37.	Ground Peanut Hulls, sometimes used in molasses feeds,	4.50	.81	67.31
38.	Dairy Feed, containing oats, oat hulls, oat bran, gluten, corn, wheat middlings, cottonseed meal and 1.49 per cent. of salt,	19.88	4.98	10.02
39.	Buckwheat Feed, sold as middlings,	15.19	4.05	30.15
40.	Buckwheat Middlings, containing corn meal and sold as buckwheat middlings,	10.88	3.30	16.35
41.	Oat Feed, containing oat hulls, oat middlings, oat shorts and corn,	7.31	3.58	12.99
42.	Ground Oat Hulls,	2.88	1.01	32.18
43.	Poultry Food, containing wheat feed, Venetian Red, rice hulls, corn, fenugreek, sulphur and salt,	8.44	2.84	13.37
44.	Yellow Ochre, an iron compound, used in poultry foods, also used in paint manufacture,	.....	.....	.....
45.	Venetian Red, an iron compound, found in poultry foods, used in paint manufacture,	.....	.....	.....
46.	Alfalfa Meal,	13.94	2.18	33.76
47.	Alfalfa Stock Feed, containing alfalfa, corn chop, bran, shorts and linseed oil meal,	13.31	3.89	13.50
48.	Alfalfa Horse Feed, containing alfalfa, corn, oats, salt and ground peanut meal,	11.88	3.50	22.86
49.	Cocoa Hulls, sometimes used to adulterate linseed meal,	18.56	3.44	16.72
50.	Ground Cocoa Hulls,	18.56	3.44	16.72
51.	Peanut Bran,	17.06	25.36	10.68
52.	Ground Peanut Bran,	17.06	25.36	10.68
53.	Peanut Meal,	39.66	14.34	3.46
54.	Calf Meal, containing cottonseed meal, wheat feed, flaxseed, lentils, beans, peas and salt,	28.38	5.29	5.40

As an illustration, Sample No. 1, a cottonseed meal, is a high grade feed containing 43.63 per cent. protein and was sold for $33 per ton. No. 2 is a cottonseed meal adulterated with hulls, containing 37.66 per cent. protein and sold for $32 per ton. In the case of the high grade feed, a purchaser would obtain 26.4 pounds of protein for $1.00, and in buying the low grade material, he would get only

23.5 pounds for the same amount of money. A feed thus adulterated contains approximately 15 per cent. of cottonseed hulls, which contains only 2.1 per cent. protein, .50 per cent. fat and 50 per cent. fiber. Three hundred pounds of hulls would therefore be sold in each ton of feed, for $4.80 or at the rate of $32 per ton for cottonseed hulls.

In some instances, flax screenings have been sold as flax meal. Sample No. 6 being flax meal and Sample No. 8, screenings. In this case, the consumer, instead of securing pure ground flaxseed, would get for his money, ground screenings, when purchasing this article, which consists of a large number of weed seeds and chaff. No. 9 is another feed which is sometimes sold for a pure flax product and is a refuse from the flax plant, including the shives or outside portion of the flax plant not used in the manufacture of twine, or fiber, together with weed seeds.

No. 11 is a product found on our market which was sold as brewers' grains and which contained malt sprouts and rice hulls. The adulterant, rice hulls, found in this feed, is one of the most commonly used and is not only high in crude fiber, but is very indigestible. The edges of the hulls are lined with fine teeth resembling the teeth of a saw. These sharp edges irritate the mucus membrane or lining of the animal's stomach and greatly impair the digestive function. The analysis of pure brewers' grains and of the inferior sample, does not differ very much, but the composition does differ greatly. From the comparison of these two feeds, it is evident that the composition or ingredients of the same should be plainly printed on the bag in order that a prospective buyer who may not know what the percentage of protein, fat and fiber may be, can readily determine the quality of such material by knowing the several ingredients contained therein.

We have collected many gluten feeds during the past year, which have been artificially colored or dyed with aniline dye. This coloring is done to make the feeds more uniform in color where white corn is used in the manufacture. A very small amount of dye is used to secure the required color, and it is not known whether or not this amount of dye has any injurious effect upon the stock using this feed in the ration. No. 12 is an average gluten feed not colored, No. 13 is one which is colored, No. 14 is the dye used, No. 15 is the acid solution which has been extracted from a colored feed, and No. 16 is some woolen yarn which has been dyed with the acid solution.

Another source of adulteration is from weed seeds and ground corn cobs. Weed seeds or wheat screenings are used largely in molasses feeds and ground corn cobs are used to cheapen the wheat products, such as wheat bran, wheat feed and wheat middlings. No. 17 is an average sample of wheat middlings, No. 18 is a sample of wheat middlings containing weed seeds, No. 19 is a sample of middlings containing ground corn cobs and so stated on the bag, and No. 20 is one of the several samples of wheat middlings adulterated with over 25 per cent. of corn cobs and sold as the pure article. In the case of the feed containing weed seeds, it will be noticed from a comparison of its analysis with that of the pure sample, that the protein, fat and fiber content is a little higher. Weed

seeds or screenings usually carry more or less broken flaxseed and contain much more crude fat and crude fiber than wheat middlings. However, their palatability and digestibility are questionable. It is a question for the stock feeder to decide for himself, whether he shall feed his stock with pure wheat middlings or whether he shall use the same, mixed with weed seeds. If the ingredients of these feeds are plainly legible on the bags containing them, he can readily choose one from the other. The many weed seeds which are always present in screenings are of various composition. Some are noxious and poisonous in their nature and may seriously impair the health of the animals in question.

No. 24 is a sample of ground corn cobs. It is needless to comment on the feeding value of ground corn cobs in the ration. That they are cheap is well known. They carry over 30 per cent. of crude fiber or indigestible matter and are of a very tough and fibrous nature. We have found a large number of wheat middlings so adulterated in our State, and in some cases as high as 40 per cent. of cobs were used. In the case of No. 20, with 11.35 per cent. of protein, which was sold as pure wheat middlings for $31 per ton, a purchaser would obtain only 7.3 pounds of protein for $1.00; whereas, in the case of No. 17, having 18 per cent. of protein which sold for $33 per ton, he would receive 11 pounds of protein for $1.00. In other words, when he bought a shipment of feed like No. 20, he was paying at the rate of $31 per ton for 858 pounds of ground corn cobs. It is obvious that although the cheaper article was sold for $2.00 less per ton, the value of the money invested, was not received in this case.

No. 21 is a wheat bran which is alive with small beetles. These beetles are very often found in wheat feeds and in poultry feeds. No. 31 contains a few of the same and a few worms found from time to time in some of the samples received.

A large number of molasses feeds are found on the market, the composition of which is decidedly varied and interesting. The principal ingredients of inferior quality used in these feeds are rice hulls, oat hulls, barley hulls, weed seeds or wheat screenings, buckwheat hulls, cottonseed hulls, ground corn cobs and in some instances ground peanut hulls. These, together with a small proportion of cereals such as corn, oats, brewers' grains, malt sprouts, cottonseed meal, etc., and a liberal supply of molasses to cover up the deception, constitute many of our poor quality molasses feeds. The samples, No. 28 and 30 are good illustrations of such feed. No. 29 is such a feed alive with meal mites, which are so small that they cannot be readily detected with the unaided eye, yet by close inspection, the feed may be seen to have motion and be literally alive with these small insects. Many of these feeds are wet and musty, affording a prime condition for the growth of beetles and mites, and it is impossible to believe that any man could be persuaded to feed such material to his stock. The weed seeds contained in these feeds, will, if the life is not destroyed by some process such as heating or grinding, pass through the animal, be transplanted to the fields and contaminate the grains grown thereon. Some of the seeds are of such a nature as to poison the system or disarrange

the functions of digestion, as previously stated. The corn cockle, for example, is said to contain a poisonous substance called sapotoxin, which has been known to cause death in a few instances. No. 34 is a sample of wheat screenings containing weed seeds, and No. 35 is a ground sample of the same. No. 32 is a ground sample of rice hulls as found in feeds, and No. 33 the same as used for packing glass ware, china ware, etc. No. 37 is a sample of ground peanut hulls, sometimes used in molasses feeds. No. 40 is buckwheat middlings containing corn meal and sold as buckwheat middlings. No. 42 is a sample of ground oat hulls used to cheapen dairy feeds and also used in place of whole oats in many chop feeds where oats are supposed to be used. No. 43 is a poultry food containing rice hulls, as a filler, and Venetian Red to give it color.

No. 44 is a Yellow Ochre, an iron compound, and No. 45 is Venetian Red, another iron compound, both being used in poultry feeds.

As was stated at the outset, only a few of the more important feeds, together with some of those of inferior quality which we received during our inspection work of 1908 were prepared, with the hope that the work could be illustrated without making a too cumbersome report, or going over the same ground covered by other papers to be presented on the same subject. That many feeds are adulterated is easily seen, and it is of great importance to the stock feeders and to the feed dealers doing a legitimate business in this State, that the sale of spurious feeds be stopped, and the shipment into Pennsylvania of the same, be discontinued.

The following Table shows the actual amount of protein and fat which the consumer obtained in 1907, for $1.00 at current retail prices. This Table and the discussion were taken from Bulletin 167 of the Department of Agriculture, relating to Commercial Feeding Stuffs in Pennsylvania, in 1907, prepared by Chief Chemist Fuller of the Department.

POUNDS OF PROTEIN AND FAT OBTAINED IN FEEDING STUFFS FOR ONE DOLLAR, AT CURRENT RETAIL PRICES.

Name of Feeding Stuff.	Protein.	Fat.
Class 1 (30 Per Cent.-45 Per Cent. Protein).		
Cottonseed meal,	24.55	5.99
Linseed meal, N. P.,	22.18	1.78
Linseed meal, O. P.,	19.00	3.95
Biles' fourex grains,	20.29	8.41
Class 2 (20 Per Cent.-30 Per Cent. Protein).		
Ajax flakes,	19.51	8.84
Blue ribbon corn grains,	20.14	5.58
Pekin gluten feed,	17.38	2.41
Brewers' grains,	23.11	6.40
Malt sprouts,	21.06	1.65
Primo golden dairy feed,	13.45	4.14
Warner's gluten feed,	16.87	2.03
Buffalo gluten feed,	16.30	2.64
Corn protegran,	16.88	6.70
Schumacher's calf meal,	5.38	2.13
Union brand gluten feed,	13.81	3.50

POUNDS OF PROTEIN AND FAT OBTAINED IN FEEDING STUFFS FOR ONE DOLLAR, AT CURRENT RETAIL PRICES—Continued.

Name of Feeding Stuff.	Protein.	Fat.
Class 3 (14 Per Cent.-20 Per Cent. Protein).		
Protena dairy feed,	15.80	3.22
Piel Brothers' gluten feed,	12.70	2.49
Sucrene dairy feed,	13.17	3.89
Wheat middlings,	11.02	3.37
Low grade flour,	10.05	2.61
Primo Hercules horse feed,	8.65	2.55
Mixed feed: Wheat by-products,	11.10	3.37
Wheat bran,	10.98	3.50
Three star molasses grains,	14.98	2.09
Mueller's molasses grains,	12.61	3.01
Primo peerless hog feed,	7.32	2.57
Hammond dairy feed,	11.78	3.28
Red cow dairy feed,	12.71	3.03

They also visited a number of cities and towns in the different counties, at which points they did not take samples, as they had taken samples of the goods they found at the different feed stores at other points in the said counties. This will show to you the effort that the Department has put forth to secure samples of feeds throughout the Commonwealth. These agents distributed copies of the law to each dealer and gave him what information they could to help him sell the goods in the proper manner.

I have a full list of the cities and towns visited by myself and the agents, but this would take up too much of your valuable time.

The question that comes up in your minds, is, what do you find and what are the feed conditions in Pennsylvania? This, I will try and answer. Science has done great things for the farmers of Pennsylvania. Through our Experimental Station at State College, through our bulletins that are issued by the Department of Agriculture of Pennsylvania and by the Department of Agriculture of the United States, through their different Experimental Stations, the farmer has been taught to care for his stock, grow better crops, care for his land, make better butter, grow better fruit, combat with his insect pests, and in a number of other ways, he has been taught to extend his business; but while he is being taught these things by science, science is also teaching men the way to defraud the farmer and stock feeder. We have on our markets the various molasses feeds which cover up the different adulterants that enter into these feeds. Along this line, First Assistant Chemist, Mr. Kellogg, has prepared an exhibit of the different kinds of adulterants:

Name of Feeding Stuff.	Protein.	Fat.
Class 4 (8 Per Cent.-14 Per Cent. Protein).		
Holstein sugar feed,	10.78	2.84
Creamo dairy feed,	10.00	2.66
Sucrene horse, mule and ox feed,	9.45	2.98
American poultry food,	7.54	3.18
Quaker dairy feed,	9.24	2.85
Illinois gluten feed,	8.27	2.23
Alfalfa horse feed,	8.49	3.44
Wellington gluten feed,	7.50	2.19
Ideal horse feed,	8.19	2.58
Schumacher's stock feed,	7.11	2.81
Sterling stock feed,	6.53	2.31
Hominy feed,	6.49	5.09
Corn feed meal,	6.33	3.82
Dried beet pulp,	7.63	.59
Corno horse and mule feed,	6.03	2.73
Victor feed,	5.60	2.63
Boss chop feed,	5.59	2.53
Class 5 (5 Per Cent.-8 Per Cent. Protein).		
Regal stock feed,	4.80	1.96
Royal oat feed,	6.03	1.85

The average amounts of protein and fat, respectively, which may be obtained for $1.00, in the five different classes, are as follows:

Class 1, 21.50 and 5.03 pounds.
Class 2, 16.72 and 4.18 pounds.
Class 3, 11.76 and 2.99 pounds.
Class 4, 7.69 and 2.79 pounds.
Class 5, 5.42 and 1.91 pounds.

It is noticeable that the amounts of protein and fat obtainable for one dollar constantly decreases from Class 1 to Class 5. All the feeds included in the first three classes may be considered protein feeds and all those in the last two classes are chiefly carbohydrate feeds. As the farmer needs to purchase protein to supplement the home grown feeds, it is certainly unwise for him to buy any article included in the last two classes. Occasionally one may find it to his advantage to purchase some carbo-hydrate feed included in Class 4, but under no circumstances, can the writer recommend the purchase of such material as is found in Class 5, at the prevailing prices. The figures found in the preceding table are based on the average retail prices of the feeds during 1907. The price of the same article varies according to locality and, of course, is a great factor in the selection of proper materials.

I would like to call attention to some of these samples that are here before you to-day for your inspection and as an object lesson, of pure feeds and adulterated feeds and the adulterants which enter into the compounding of feeds that are on the market in Pennsylvania to day.

First, I want to bring to your attention oats chop made from oat grains, and compare it to oat hulls. The analysis of oats is as follows: Protein, 11.8 per cent., fat, 5.00 per cent., fiber, 5.1 per cent. The analysis of oat hulls varies considerably. You will find in looking on the bottles that the protein as given on this sample, is 2.88 per cent., fat, 1.01 per cent. and fiber, 32.18 per cent. The analyses that I have based this comparison on are those which are

furnished in our bulletin last year. This gives 3.03 per cent. protein, 1.06 per cent. fat and 29.07 per cent. fiber. Please note the difference in the fiber or the woody part of the feed. Between one-fourth and one-third of this sample is fiber. This, as you know, would effect the low protein and fat and leave you only about 2 per cent. of protein and 0.71 per cent. of fat. In oats chop, and oats, you will find the fiber is 9.05 per cent. or less than one-third of the amount that you find in oat hulls, but you have 5.00 per cent. of fat and 11.8 per cent. of protein. Making the basis, we find that oats chop would be reduced less than one-tenth per cent., leaving in the oats chop, 10.07 per cent. of protein and 4.50 per cent. of fat.

This brings up the question, does it pay to buy this material? I was going to call it feed, but I do not think it is a feed.

The second article that I wish to bring up is peanut hulls. The analysis is 4.50 per cent. protein, 0.81 per cent. fat and 67.31 per cent. fiber. Here is a substance that over two-thirds of it is fiber and this is one of the materials that is offered for sale on the market to the millers and compounders of feed, to use as adulterants.

I would call your attention to ground corn cobs, the analysis of which is as follows: Protein, 2.50 per cent., fat, 0.50 per cent., fiber, 30.00 per cent. Here you have almost one-third fiber. This is becoming one of the principal adulterants on the market. The corn cobs are bought in wholesale quantities in the west where the corn is shelled and ground to a fine powder. This is used to adulterate bran and wheat middlings.

In the analysis of corn, we find that the protein is 10.5 per cent., fat, 5.4 per cent. and fiber 2.10 per cent. The corn cob has almost one-third fiber. This would leave 0.34 per cent. of fat and 1.67 per cent. of protein. Do you farmers and stock feeders wish to purchase this kind of material mixed with your bran and middlings? Last fall, we found on the markets of Pennsylvania a large amount of wheat middlings that contained forty per cent. of corn cobs. This feed was being sold at retail at $32 per ton. Our agents secured samples out of eight different carloads and the analysis averaged about the same.

By direction of the Secretary of Agriculture, I brought suit on these samples and the manufacturers of this feed in the West paid the fines of $50 in each case and the costs; but, under our law, they claim the right to sell this material, branding it "Jersey Mixed Feed" by putting the composition on the sacks as well as the analysis. It is a question in my mind whether the law recognizes corn cobs as a feed and in another part of this report I will call your attention more directly to this subject.

The great State of Pennsylvania was made richer by the prosecution of these cases, but I wish to call your attention to the loss that was sustained by the citizens who purchased this feed, taking it on a basis of eight carloads and twenty tons to the car, making 160 ton, this computed at $32 per ton, would amount to $5,120. If forty per cent. of this was corn cobs, as the Chemist found, and was not disputed by the manufacturers, we find a loss of $2,048 to the farmers and stock feeders of this Commonwealth. There may be some question taken in regard to these figures by some who claim

that there is some feeding value in corn cobs, but is there enough of feeding value in them to pay for the expense of preparing them for feed.

I want to call your attention to samples of weed seeds, as prepared in our exhibit. These are known as wheat screenings and are sold as such to the trade, but when you and I talk of wheat screenings, we think of the small grains of the wheat berry, but this is not the case to-day. The large millers in the West sieve out the weed seeds and sell them to the compounders of molasses feeds or chicken feeds, and they in turn sell them to you and your friends at from $25 to $40 per ton. You are not only defrauded in buying them for feed, but they are carried all over your farm in the manure which germinate and grow you a fine crop of weeds.

By referring to the Vermont Agricultural Experiment Station, Bulletin, No. 131, on commercial feeding stuffs, I find that there are 129,000,000 weed seeds in a ton of molasses feed, or three for every square foot of a hundred acre farm. I have the bulletin here and would refer you to the cuts, showing you what they have grown from some of these seeds.

I also would refer you to Bulletin No. 15, issued by the Maine Experiment Station on feeding stuffs, on page 196. They take at their experiment station, 100 lbs. of feed and they find that it contains 225,800 weed seeds. Sample No. 2656 contains 335,664 seeds to the hundred pounds. Sample No. 2773 contains 1,886,976 weed seeds. Sample No. 2943 contains 1,224,724 weed seeds. They claim that these seeds will all sprout or germinate. They have conducted a series of experiments and I have no doubt but that they have been conducted on a fair basis. The kinds of seeds found in these different samples were pigweed, mustard, foxtail, flax, ladies thumb and wild buckwheat. These are large figures, but they are given just as found in the Bulletins which is issued by the Stations referred to.

By referring to a sample of ground weed seeds in the exhibit that is before you, you will find that said sample runs as high, if not a little higher than wheat middlings. It is very plain to you that of two feeds having nearly the same composition, the one which is more digestible, has a greater nutritive value. Although these screenings contain approximately the same amount of crude protein as wheat middlings and approximately four times as much crude fat, yet it is very doubtful whether an equal value could be placed upon them. Although the percentage of crude protein and crude fat are used to judge of the quality of feeding stuffs, yet the healthfulness and palatability of a feed largely determine its value for feeding domestic animals. To the best of our knowledge, no digestion experiments have been undertaken to prove the digestibility of weed seeds.

One alfalfa firm in the City of Pittsburg sold 150 carloads in the last 6 months. A gentleman in Nebraska informed me that alfalfa has increased their farm land $5.00 per acre as they can grow more hogs and keep more cows.

Why not raise alfalfa in Pennsylvania?

Inasmuch as alfalfa has been used of late to a considerable extent, it seems advisable to call your attention to its value as a feed. I

have, therefore, requested Prof. F. D. Fuller, Chief Chemist, to prepare something along this line, which is as follows:

THE PRODUCTION OF ALFALFA AND ITS FEEDING VALUE.

One very important factor in successful dairying is the question of feed. Probably no one in this audience has failed to hear of the merits of alfalfa for feeding purposes, and yet, I believe that there are a large number who do not fully appreciate its value.

This plant flourishes in the Western part of the United States. Although red clover is of vast importance to the country east of the Mississippi, yet, alfalfa is of even more importance to the Western section. In California, the plant reaches its highest perfection, yielding five to seven cuttings per year. In Colorado and Utah two to three cuttings are obtained. In the East it is gaining in favor, as the farmers are being informed as to the proper method of growing.

Wheat bran has, for a long time, been recognized as a leading feed for dairy animals, but let us compare this article with alfalfa, looking at the matter from a chemical standpoint. Alfalfa contains 11 per cent. of digestible protein and wheat bran, 12.3 per cent.; or in other words, every 100 pounds of alfalfa will yield 11 pounds of digestible protein and that of wheat bran will yield 12.3 pounds of digestible protein. If an average sample of alfalfa contains 11 per cent., then a good quality of alfalfa hay will contain just about as much digestible protein as wheat bran. At our own Experiment Station, trial tests have been made, which show emphatically the value of alfalfa and which prove that it is practically equal to wheat bran, pound per pound. Assuming that four tons of alfalfa per acre is an average yield, here is a chance to produce four tons of the equivalent of wheat bran, and if farmers could produce four tons of wheat bran to the acre, they would think they were doing well. Other things being equal, the most desirable crop is the one producing the largest amount of digestible dry matter. A satisfactory crop of corn or alfalfa contains much more dry matter per acre than one of oats or peas.

During the past year, there has been imported into Pennsylvania a large quantity of alfalfa. This has come to us in a finely cut condition and retailed at $22 to $35 per ton. There is no reason for believing that alfalfa meal is any more digestible than the hay from which it is made, and it may be less digestible owing to the temptation to adulterate. I reason this question: Can you afford to pay $30 per ton for alfalfa grown in Kansas or Oklahoma, when by careful study of the required conditions, you can probably produce this crop on your own farms? According to the chemical composition of red clover and the results obtained in its use, it has been found that two tons of alfalfa hay is practically equal to three tons of red clover.

Alfalfa is a perennial plant, it produces a large yield, its roots bring up plant food from the sub-soil, and they are covered with tubercles containing micro-organisms that have the power to con-

vert the nitrogen of the atmosphere into plant food, thus enriching the soil upon which it is grown. In view of the above facts, it behooves us to carefully study the conditions under which it thrives the best, so that the time may soon come when Pennsylvania will produce satisfactory crops of alfalfa, at which time, there will be less necessity for the purchase of nitrogenous commercial feeding stuffs.

During the year 1907, prosecution was brought on 47 adulterated or misbranded samples. These were all favorably terminated by the Department. In 1908, there have been brought 128 prosecutions. One hundred and eleven have been terminated and 17 are now pending, in different sections of the Commonwealth. The majority of these cases were based on that section of the law that makes it a penalty for adulteration or a number were based on the section that makes it a penalty for false analysis or guarantees, and others for not giving any analysis, postoffice address, weight or composition. These cases were all gone over by the Secretary of Agriculture, the Chief Chemist and myself. More prosecutions might have been brought under some technicality of the law, but as the purpose of the Department of Agriculture was to secure obedience to the law, rather than to collect revenue for the Commonwealth, it was thought best, in order to avoid appearances of being oppressive, to pass by the instances in which the violation was trifling and apparently unintentional, when a pledge upon the part of the manufacturer and dealer could be secured, to give closer attention to the provisions of the law, and to faithfully observe the same in the future. In every case, however, where the violation was such as to indicate the disposition to defraud, proceedings were instituted.

We find that the following states have Feeding Stuff Laws: Eastern, Middle and Middle West: Maine, Rhode Island, Vermont, Connecticut, Massachusetts, New Hampshire, New York, New Jersey, Pennsylvania, Michigan, Wisconsin, Indiana, Ohio, Illinois. Southern: North Carolina, Georgia, Florida, Virginia, Texas, Arkansas, Louisiana, Kentucky, Tennessee, Maryland. Western: North Dakota, South Dakota, Washington, Iowa, Kansas, Oklahoma.

The first state to pass a Feeding Stuffs Law was Connecticut. This will give you some idea of the interest that is being taken by the different states on this subject.

Prof. T. D. Fuller, Chief Chemist of the Department is in charge of the office and laboratory work which has grown in the last year. Over 4,000 letters have been written. A large number of these were written in answer to letters from manufacturers, millers and dealers throughout the United States, seeking information in regard to the Feeding Stuff Law and other information that they were desirous of obtaining from this office. The millers of the State have given the law a good support. This is to be commended, as every ton of poor feed or adulterated feed sold in Pennsylvania by the compounders of by-products feed, just takes the place of that amount of good feed. With the water facilities that we have in Pennsylvania and the large amount of coal, we should have double the number of mills that we have at this time, and I am glad to see

a disposition on the part of our people to buy feeds also flours, manufactured in our own State. This should be encouraged; but I would not want you to think that all manufacturers of by-product feeds are poor and that the said manufacturers set our laws at naught. This is not the case. Some of those who obey the law the very best are the western manufacturers of feed. The truth is, they give better weight than some of our own manufacturers. There is a custom prevailing in our State to give only 95 lbs. for 100 weight, claiming that the five lbs. pay for the sack. This is not right. When a man buys 100 lbs. of feed, he should pay for the same and also should be charged a sufficient amount to pay for the sack. I know of some cases where millers were giving only 81 lbs. for 100 weight. Our law does not regulate this. It only says that the number of pounds shall be put on the sack.

There is on file in the office a mailing list of 5,000 names. To these persons there have been mailed bulletins and other information in regard to the Feeding Stuff Law. This will give you some idea how this work has grown in the last two years.

SUGGESTIONS FOR IMPROVING THE PRESENT FEEDING STUFF LAW IN ORDER TO SECURE GREATER PROTECTION TO CONSUMERS OF THE SAME.

The following recommendations are suggested as result of our experience in enforcing the Feeding Stuffs Law, during the past two years.

First. Elimination of the word "minimum" in Section 1, thereby providing for the guarantee of the actual percentage of crude protein and crude fat.

Second. Extending the definition of the term "concentrated commercial feeding stuffs" to include all feeds used for live stock and poultry, except hay, straws and corn stover, when the same are not mixed with other materials, also whole seeds or grains of cereals, when unmixed with other materials; and wheat bran or wheat middlings, rye bran or rye middlings, buckwheat bran or buckwheat middlings, or any mixture of two or more of these articles, which must be sold under a guarantee of purity.

Third. Prohibition of the adulteration of any feeding stuff with foreign, mineral or other substance or substances, such as rice hulls, peanut shells, corn cobs, oat hulls or similar materials of little or no feeding value.

It is important that you, as a State Board of Agriculture, be informed on all points in regard to this important law, and this is the reason I call your attention to the suggestions or changes that we think would strengthen it. Twice during the year, lawyers for the defense, have tried to get a decision on the constitutionality of the law, and at this time the constitutionality of the law is before court in Lehigh County. The argument is to be held on the first Monday of March, next.

The contention on the part of the defendants is based on that part of Section 1, which says "Wheat bran or wheat middlings, rye bran or rye middlings used for feeding domestic animals, sold, offered or exposed for sale within this State, at any other place than at the mill where manufactured." This, they claim, is unconstitutional, as it favors one class above another.

As the Legislature is now in session, we think that it would be the proper time to strengthen or pass a new law that would cover these objectional features. We would respectfully ask for your cooperation and aid in carrying out the above suggestions.

The CHAIRMAN: What shall be done with this very instructive report?

MR. COWAN: I move it be received and placed on file.

This motion was properly seconded, and duly carried in the regular way.

The CHAIRMAN: We will now deviate a little from our regular program, to listen for a short time to one of our oldest friends; to the old soldiers I would say "General;" to the common citizens I would say "Governor;" to the lawyers I would say "Judge," but to the farmers here, I shall say "Farmer" Beaver.

ADDRESS OF GENERAL BEAVER.

Fellow-Farmers: There is nothing like having the best, and our farmer from Clinton County is that, if he is anything. I just want to thank my friend Hutchison for making his splendid argument on the Feeding Stuffs Law, because he will have to make it later before the Superior Court. His suggestions will be much more valuable to the Judges than any arguments could be.

The Chairman does not state the real object in introducing me, and taking the time from the regular program, so I will do so; we have with us to-day one of the Ex-officio Members of the Board, who is meeting with us to-day for the first time. He has been in Pennsylvania only a few months, but he has been busy making acquaintances, and he says he will not be satisfied until he has made the acquaintance of every county in the State. There are very few men who have done this. This State is a great empire, and he will have his hands full if he does that in a year, but Dr. Sparks, the President of State College, whom I have the pleasure of introducing to you, has the pleasure and privilege of meeting those of you who are here to-day, and you will have the pleasure of hearing from him a little later. The Chairman of the Meeting has asked me to present Dr. Sparks to you, so that when he comes to your several counties, you may know him, and I am sure that when he does come, you will like him. Let me present to the audience Dr. Edwin Earle Sparks.

ADDRESS OF DR. SPARKS.

I do not want to be behind my friend, General Beaver, so I will say "Fellow-farmers." I own a farm in Ohio—I think it has nine acres—and if I live long enough I hope to be able to get the taxes out of it. This may sound big to you, but if you knew the part of Ohio in which the farm is located, you might have a little more faith in me.

When I came up to State College a few months ago, four hundred of the boys came round to Prof. Jackson's house, and made a great demonstration. Prof. Jackson went out and asked them what they wanted, and they said "we want to see what we have drawn!" They were kind enough to refer to me as a prize.

I had the pleasure of meeting some of you at the Grange Meeting up in Tioga county, and hope I shall have the pleasure of seeing many more of you at Pennsylvania State College. We have planned to take care of a great many of you during our next Farmers' Week, and we want more of your boys and girls up there. We have about 500 of them up there now, and want more of them. Right here I want to say that I believe one of the principal reasons that the boy or girl leaves the farm is the education they receive. From the time they enter the common schools, everything draws away from the farm. They are taught the difference between Apothecaries' weight and Troy measure but nothing that pertains to farm life. Dr. Schaeffer and Dean Hunt are both trying to introduce into our schools some of the studies that will tend to develop the interest of the child in farm life, and farm work, and will enable him to utilize them on the farm as well as in commercial life. I believe the time will come when the essentials of agriculture will be taught in the public schools, so that only the scientific side of it will be necessary to be studied in our Agricultural Colleges. The time has passed when it was thought that anything would do for the farmer; the time has come when it is necessary to prepare for farming as well as for commercial or professional life. In order that this may be done, we intend next summer to have a summer school for teachers, where in six or eight weeks, they can learn the elements of agriculture, which they are, in turn, to teach to their pupils the following winter. I want your co-operation in this. I believe it will result in benefit not only to your schools, but to your farms, as well.

I thank you for this opportunity to say "how do you do?" I hope to meet you all again in your homes, and especially to see you all up at our lectures at Pennsylvania State College.

When I saw the Stereopticon here I was in hopes that either Dr. Hunt or Prof. Surface might have something to say to us while I am here. Dr. Hunt can tell you about our progress in Agriculture up at the College. In another department we are making excellent progress, and this is in Forestry; to this the people have to be educated, but it is a greater work than engineering; forestry is constructive, where engineering is destructive. I wish I could show you the way, so that you could see how much forestry is doing towards making our rivers navigable. But I must not exceed the patience of my long-suffering friend, Mr. Herr.

The CHAIRMAN: Is the Committee on Legislation ready to report?

MR. KAHLER: I want to say a few words before presenting this report, so it will not appear like reiterating some things. Last year there was no meeting of the Legislature, and there were some little changes to be made in the report of that year, so it was decided to send the report back to the Committee for amendment before presenting it to the Legislature. Your Committee has gone over this report, and revised and amended it to the best of our ability. My throat is in rather bad condition, so Mr. McGowan will read the report.

REPORT OF THE LEGISLATIVE COMMITTEE.

In presenting this report at this time, we deem it necessary to refer to a few things that have been accomplished in the past year, due, we believe, in a great measure to the persistent efforts of this State Board, by their endorsement, and the sentiment they have created in favor of measures which we firmly believe will be the most efficient way of accomplishing what we want. For a number of years we advocated giving greater privileges to trolley cars, and for a two cent rate on our railroads, &c.

Among the Bills passed by the General Assembly, favorable to farmers, we wish to name the new Feeding Stuffs Law, which is more stringent than its predecessor; the law requiring a chemical analysis of Paris Green, and establishing a standard which it must measure up to; the Meat Inspection Law, without which the Federal inspected meats from the West would have wiped out our homes dressed meat; the law requiring the wearing of metal tags by dogs on which license has been paid is not stringent enough, in our opinion.

The Registration of Stallions, whereby we hope to get rid of the practice of raising poorly-bred horse stock; the increased appropriation to the Department of Agriculture to be used for the destruction of plant disease and insect pests; increased appropriation for Farmers' Institute Work; also a larger appropriation for public schools.

We would now also recommend the following:

WHEREAS: The Farmers' Institutes are performing a great work for the advancement of Agriculture, and realizing the importance of conserving the resources of the State through this agency, and that of Movable Schools of Agriculture, Therefore,

BE IT RESOLVED: That we recommend for the favorable consideration of the Legislature at its present session, an increase in the appropriation for this purpose to $50,000.

We further believe that the passage of the Act appropriating $1,000 to each County maintaining an Agricultural Fair for the purpose of increasing the amounts of premiums paid on agricultural products, will be of great benefit to the Agricultural interests of the State, and the Legislature should be highly commended for the same.

In the last session, an attempt was made to pass a Bill requiring manufacturers of Fertilizers to state upon the package containing the same, the sources from which the fertilizing ingredients are derived. This Bill was vigorously fought by the largest Fertilizer manufacturers of the State and country, was passed without any opposition in the House, but failed in the Senate. We would recommend a renewed effort to pass this Bill.

A Bill was passed by the last Legislature by which the State was to pay for the betterment of our rural roads, by appropriating 50 per cent. of the cost, but, owing to the failure of the Senate to pass revenue bills, the appropriation was not granted. We would respectfully recommend the same to our present Legislature.

We hereby express our approval of the "Geiger Milk Law," which assures the farmer of the State a "square deal," in that he (the farmer) now receives his pay for every quart of milk sold, instead of, as heretofore, having to furnish 46 quarts, and only receiving pay for 40 quarts. Formerly the farmer sold by dry measure, and the dealer by liquid measure. Now both sell by liquid measure, thus establishing a uniform standard of milk measure.

We highly commend the "McGowans' Clean Milk Can Law," which calls for the thorough cleaning of all milk cans and other vessels shipped on railroads, before being returned to the shipper. Under penalty of $50 fine, no milk can or other vessels can now be returned by the receiver of milk to the shipper thereof, unless thoroughly cleansed—which we regard as helpful, from a sanitary point of view, as well as being of great value to the farmer.

We would also recommend an amendment to what is known as the "Vaccination Law," placing the responsibility on the School Board, and not on the teacher, and the penalty for violation on the parent or guardian and not upon the scholar, as in many cases the result is that it deprives the child of half the term of school.

We favor the State to build the inter-county roads, the entire cost to be borne by the State. These roads, as far as practicable, leading from one county seat to another, shall be determined by the County Commissioners in conjunction with the State Highway Commissioner, and that these roads shall be built within a period of ten years. The appropriation for the roads shall be distributed in proportion to the number of miles of road in each county.

We are in favor of a Township Road Law that will require the State to appropriate 50 cents on each dollar raised in cash by the Township, not more, however, than $20.00 to be given by the State to any one mile. The appointment of Road Masters shall be made optional with the supervisors.

We also demand a law to tax railroads and corporate property locally for road purposes.

We also favor that the annual assessment made by the assessors of the various townships throughout the State be made in the month of April, instead of in the Fall of the year, as is now the present system.

Inasmuch as real estate in Pennsylvania now pays sixteen mills tax on the dollar, while corporate and personal property pays only three mills, we earnestly demand as a step towards securing equalization of taxes, that the State shall pay the minimum salary of public school teachers for the minimum term.

We would recommend an amendment to what is known as the "State Road Law," wherein it provides for joint action of the State, County and Townships, and let the State take the whole responsibility of making the State Roads, and distributing whatever money the State feels able to pay to the different counties in accordance with the miles of road in said counties in a similar manner by which the school appropriation is distributed, which would be some relief to the over-burdened taxation on real estate and would not be as complicated and would hasten the construction of our roads, for at present it takes months for all the parties to agree.

In conclusion, Agriculture being the basis of all prosperity, which is proven by all past history, we assert as follows:

Any nation that looks after the agricultural interests of the country has prospered on every hand, but whenever the agricultural interests have been neglected, retrogression and downfall have been the result. Therefore, in the opinion of this Committee, every effort should be put forth to foster our agricultural interests. Every dollar advanced for an agricultural education will return an hundred fold. We therefore believe that this end cannot be served better than to use every effort to promote the greater development of our State College and our Experimental Station, our Farmers Institutes, Schools of Agriculture &c., so that our State College, of which we are so justly proud, and which institution is doing such a grand and noble work throughout our State, casting its influence on every hand, will continue to blossom as the rose, and favorably compare with our sister states; yea, and with the granting of the State appropriation that is justly and fairly due this grand and noble institution, will we place our grand old Commonwealth of Pennsylvania among the leading states of our Union.

(Signed)

A. J. KAHLER, Chairman,
H. G. McGOWAN,
JASON SEXTON,
MATTHEW RODGERS,
S. S. BLYHOLDER.

The CHAIRMAN: You have heard the report of the Legislative Committee; what shall be done with it?

The SECRETARY: I move that it be adopted.

This motion was properly seconded, and duly carried in the regular way.

The SECRETARY: When we move the adoption of the report, we also approve the report. That is why I made the motion in this manner, instead of in the usual way.

The SECRETARY: Before we go any further, may I say that the Governor has just sent his Private Secretary down to express his very high appreciation of the honor we have done him in asking him to come here and preside over us, but he is at present engaged with a Board of Commissioners from the Soldiers and Sailors Home at Erie; these gentlemen are now in his office, and he therefore

expresses his deep regret in not being able to be with us this afternoon. I presume he inferred, from what he said, that this would be his last opportunity to be with us, but I told him there would be another meeting of the farmers here tomorrow, when he would be very welcome, but his Secretary could not tell what his engagements would be for that time.

The CHAIRMAN: The next number on the program is an address on "Alfalfa" by Dr. E. B. Voorhees.

Dr. Voorhees' paper was as follows:

ALFALFA.

By DR. E. B. VOORHEES, *of New Jersey Experiment Station.*

The interest of our State in alfalfa began in 1886, and during the period since that year, our observations and investigations have been continued and the results obtained have been such as to cause us to have an abounding faith in the adaptability and usefulness of this plant to the farms and farmers of the Eastern States.

At that time, it was practically new to the East, although attempts to grow it were made as early as 1791, but with indifferent success; it was believed to be only capable of making a satisfactory crop in the irrigated regions of the West.

In 1886, a farmer near the Station was growing alfalfa, and the Station officers were permitted to make studies of his crop. The experiments included the weighing of the yield obtained in the three cuts and the chemical analysis of the crops harvested at different times. The data thus obtained showed, first, that alfalfa was a crop that made enormous yields of green forage and hay; and second, that the nutritive quality of the forage and hay was much superior to that of red clover forage or hay, as the total yield per acre was 18.2 tons of green forage, and the feeding trials made showed that it was an exceedingly palatable forage, and its analysis showed it to be much richer in the important compound protein than red clover, which is regarded as one of the richest of the forage plants, and whose value is well established. These results were of such a promising character that in the next year, 1887, two plots, one-tenth of an acre each, were seeded with alfalfa on the College Farm. On one of these plots the seed was drilled in rows, and on the other it was broadcasted, on April 28th. On the drilled plot, which was cultivated and kept free from weeds, a first cut was made July 7th, and subsequent cuts made August 18th and September 27th, and a total yield of 20.8 tons of green forage, an equivalent of 4.5 tons of hay was obtained.

Samples from the different cuts were taken and analyzed, and the results confirmed those obtained in 1886; the dry matter being 90 per cent. richer in fat and 45 per cent. richer in protein than the dry matter of red clover.

A continuation of this experiment through 1888 gave a yield equivalent to 18.7 tons of forage, or 5.54 tons of hay per acre. The com-

position of the dry matter of the various cuts being practically the same as were shown by previous analyses.

These results were again most encouraging, as the yields were remarkable, and the produce of high nutritive quality; the hay was practically equivalent in protein content to wheat bran, which is regarded as one of the best fine feeds on the market. Naturally, plans were then made to carry on field experiments in the different parts of the State, ten of which were begun in the spring of 1887, the preparation of the soil, the seeding and the fertilizing being carefully supervised by the officers of the Station.

The results of these experiments, however, were very discouraging —all except one proving a failure. This result was then believed to be due to the time of seeding, rather than to any deficiency in the soil, the fertilizer or the manner and time of seeding.

The disappointing results of the field experiments, together with the apathy of the farmers, as a whole, toward a new crop requiring so much extra labor and care, rather discouraged further experiments at that time, but the leaven of enthusiasm introduced by a partial realization of the possibilities of a plant making such enormous yields, possessing such a high feeding value, and indicating the indirect benefits to be derived from growing so large a leguminous crop was still working, and phases of the problem was studied in other ways until 1897, ten years after the first crop was seeded at the experiment farm.

In the fall of that year, an acre of land, naturally well drained and which was reasonably free from weeds, was selected for the purpose of seeding it in the spring with alfalfa. It was deeply plowed, and subsoiled in the fall, and seeded with rye as a cover crop. In the spring, the rye was plowed down, the land thoroughly prepared, limed at the rate of a ton per acre, liberally fertilized with a mixture of ground bone, acid phosphate, muriate of potash and nitrate of soda, and sown with varying quantities of seed on the 14th of May. The germination and early growth was good; the weeds were clipped early, and by the middle of summer a fine stand was obtained, and in that same season two cuts were made, yielding a total of 8 tons of green forage. In 1899, 20.2 tons were obtained, and in 1900, 26.6 tons, equivalent to 6½ tons of hay.

This acre continued to yield well for five years or more, and at the end of the fifth year there had been harvested 96.61 tons of green forage, equivalent to 24.15 tons of dried hay, or an average yield per acre of 19.32 tons of forage, or 4.83 tons of hay, and at a cost of $26.57 per acre, an average of $5.50 per ton of hay. The yield in itself was quite remarkable, for at the prevailing prices for hay, the average selling value for the five years was $72.50 per acre, and this without re-plowing or reseeding, or any other labor than manuring and harvesting.

In addition to its producing a large yield, it was found to possess other advantages not possed by all other forage plants—it was palatable for all kinds of farm stock; it was as rich in protein as wheat bran, thus making it a feed capable of balancing the deficiencies of corn in this respect, and in proportionately reducing the necessity of purchased feeds; it possessed the power of gathering the nitrogen needed for its growth from the air, and, therefore, indirectly supplying nitrogen for the corn and other cereal crops, which can obtain it only from soil sources, and it was practically a perennial, serving for from

three to eight years without renewing it, and left the soil in better condition for other crops than it was when the alfalfa was seeded. These characteristics among other (many possibly not yet fully understood) led to other experiments, which were quite as notable in showing the extraordinary value of this crop.

In the first place, it was believed that owing to the composition of the plant, chiefly its high content of protein, it should in many ways serve as a substitute for a number, at least, of the fine feeds, which it is generally necessary to purchase upon the dairy farm. Experiments were, therefore, carried out to determine its value as a source of protein, in the making of rations for dairy cows. These experiments were highly interesting and suggestive, because they showed, first, that satisfactory rations could be made from corn silage, the chief cereal crop, and alfalfa; and second, that the yield of milk was practically the same as when rations were used whose protein was derived from other sources; and third, the cost of milk was very much lower when cost of production of alfalfa hay was taken into consideration.

In fact, the substitution of an amount of protein equivalent to that contained in a mixture of wheat bran, dried brewers' grains and mixed hay, would make the feeding value of alfalfa hay $24.52 per ton, when mixed hay could be purchased for $16 per ton, wheat bran for $26, and dried brewers' grains for $20. In other words, the low cost of production of alfalfa is accompanied by a higher feeding value—the average value per acre of the crop for 5 years being $118.43, when compared with fine feeds having an established feeding value.

Further experiments conducted at our Station and elsewhere, while variable—due to the different methods of using—all united in showing the high feeding value of well cured alfalfa hay, as compared with purchased feeds of known value at prevailing prices, and the superiority of alfalfa hay over the mixed feeds made up of refuse materials of low feeding value, but high in price. This phase of the question, while most interesting and suggestive, does not, however, show the entire advantages that may be derived from the growing of alfalfa hay.

On the average, the hay produced on this acre of land in five years contained 16.5 per cent. protein, or an equivalent of 2.66 per cent. of nitrogen. The nitrogen gathered by the average crop of hay was, therefore, 257 lbs. per acre—one-quarter of this nitrogen was probably utilized in the production of milk, as it furnished the basis of the protein in the ration for milk cows, and the remainder of 193 lbs., was contained in 1,245 lbs. of nitrate of soda.

Inasmuch as the nitrogen in this crop was not gathered from soil sources, but from the air, sufficient nitrogen was left after the hay had been fed to milk cows, to provide for that contained in 193 bushels of wheat, as a bushel of wheat will, on the average, carry about one pound of nitrogen. This amount of nitrogen, if bought in the market, in the form of high-grade fertilizers, would cost about $38, and it may be legitimately added to the value of the crop, for it may not only be assumed, but is a fact that this nitrogen is largely, if not altogether, gathered from the air, as wheat, corn and other crops seeded after alfalfa grow more luxuriantly than upon those farmed in regular rotations, and abundantly supplied with nitrogenous fertilizers. For

every ton of alfalfa hay, therefore, which was worth $24.52, as a substitute for purchased feeds at prevailing prices, there should be credited to it at least $8 for the nitrogen which the farmer does not have to purchase to grow his wheat crop, plus that which is left in the roots and stubble in the alfalfa field, and which when the land is broken is quite as capable of supplying that needed for wheat, corn and other cereals as that bought in the regular commercial forms.

These are cold facts; they are not figures dependent upon the man who figures, as anyone will testify who has grown the crop. Is it any wonder, then, that after such an experience that one should deprecate the time that could not be given to spreading the news of the wonders of alfalfa, and urging the growth of the crop whenever conditions are favorable?

As a result of this experiment, others were begun, not only at the College Farm, but elsewhere throughout the State, to determine its adaptability and to illustrate the great possibilities of this remarkable plant. These experiments, in the beginning, met with indifferent success—in many cases spring seedings failed and fall seedings failed; good soils and poor soils, apparently, did not possess the proper characteristics; good seed and poor seed did not germinate or grow; good preparation and poor were equally useless in securing a good catch and a permanent stand; in many cases, too, these failures were attributed to anything but the true cause, and it was not until after many years of study that it was possible to indicate methods by which success might be positively assured, and even now no method of practice is likely to be surely successful in securing a catch and permanent stand on new lands that does not include inoculation. The first experiments were mainly to determine the best time of seeding, and seedings were repeatedly made in every growing month of the year; the results are conclusive in showing that for the State of New Jersey, as a whole, and probably for Eastern Pennsylvania late summer or fall seeding is far preferable to spring seeding.

Further experiments were conducted also to determine the soils best adapted for the plant and the fertilizers and manure that should be applied, and it was found that the main point in reference to soil, was good physical character and that it should be naturally dry. We have grown the crop successfully upon hilltops, meadows, side hills, everywhere on good soils, poor soils and soils of indifferent fertility, when physical character and natural drainage were satisfactory.

It was also shown by these experiments, that the feeling that many had in the beginning of the work, that soils should be well supplied with yard manures, at time of seeding and afterward, is not always an advantage, in fact, in many cases a positive disadvantage—manures are all right, but they should be preferably applied to preceding crops.

An experiment was, therefore, begun in 1906, on two acres of land, in which these principles were put in practice—that is, a well drained good soil, which was well supplied with organic matter from previous manurings. This area was seeded August 20th, 1906, and four cuts obtained in the next season of 1907, which made a total yield of 6.25 tons of hay; in the summer of 1908, 7 tons of hay were obtained from four cuts, or an equivalent of 6.62 tons of hay per year for the two years. The cost of seed and fertilizer for two years totals but $16.60,

or an average per ton of hay of $1.25; the fertilizers used the first season consisted of one ton of lime and 500 lbs. per acre of a mixture

Ground bone,	200 lbs.
Acid phosphate,	200 lbs.
Muriate of potash,	100 lbs.

and in the summer of 1907-08 there was applied a dressing of

Acid phosphate,	150 lbs.
Muriate of potash,	50 lbs.

per acre. There is at present a splendid stand of alfalfa and one which promises large yields for several years to come. The manure made from the feeding of this hay is not returned to the alfalfa field, but is being utilized upon crops which have no power to gather nitrogen from the air; thus the enrichment of the soil of other fields is a part of the value of the crop.

Today, alfalfa growing can be made quite as easy as the growing of red clover or any other ordinary farm crop, provided all the conditions that have been found necessary are fully complied with, and provided, of course, weather conditions are as favorable as those that obtain when other crops are successful. While we have grown large crops in the most northern county of the state, where the strong soils exist, we have grown it with equal satisfaction upon the light, sandy soils of Southern New Jersey. In fact, with the liberal use of lime and mineral fertilizers, the light, sandy land section of South Jersey is bound to be a great alfalfa producer—already fields of 25 acres and more are found there. As an example, I cite but one case:

At Hammonton, in Atlantic Co., five acres of light, sandy land, seeded on the 5th of September, 1905, upon which only a small portion of manure was used, but which was liberally fertilized with ground bone and potash, and limed at the rate of 1 ton per acre, cut in the season of 1906, 31 tons of dried hay per acre. Numerous instances could be given of the successful growing of this crop on a wide variety of soils in this State. These various, although favorable conditions exist in Pennsylvania, New York and in all of the Eastern States, insufficient proportion to enable farmers to grow this crop successfully and to provide them with practically all the protein that they are now buying in concentrated and in mixed feeds, many of which are of doubtful value, while at the same time contributing largely to the growth of other crops.

It will only be a question of time before alfalfa is quite as much of a farm crop, if not more so, than any now grown for forage purposes, provided the farmer will make himself familiar with the facts, and be convinced and then be courageous enough to carry out his convictions.

At this point, it may be well to discuss a few of the essential factors necessarily growing alfalfa hay.

Selection of Soil.

As already pointed out, most naturally well drained soils seem to be suitable for alfalfa, provided their physical condition is good—that is, the soils that are not too open and porous, on the one hand,

which would permit the too rapid movement of water and plant-food, or too dense and compact on the other, which does not permit the ready movement of water and plant-food, and the ready penetration of the roots.

The subsoil, of course, must be similar in character to that of the surface—that is, not too dense or compact, or too open and porous, although even on soils overlying a rather tight clay, gravelly or shale subsoil, the alfalfa roots seem to be able to penetrate readily and obtain the necessary moisture and plant-food. Soils well adapted for potatoes are naturally well adapted for alfalfa, and I think, generally speaking, soils that grow corn well will grow alfalfa, provided the plant-food is supplied in abundance. Undrained soils, or those even reasonably dry on the surface, but where the permanent water-level is not more than 2 feet below the top, are not suitable.

Preparation of Soil.

Soils in all cases should be well prepared—that is, the plowing should be deep and then deeply and thoroughly cultivated, and the particles on the surface made as fine as in preparing a garden, and continued long enough to destroy weed seed. Alfalfa seeds are small, and the young plant is a feeble grower at first, and unless full opportunity is afforded for the free movement of air and moisture, and the easy penetration of the roots, germination will be faulty and many of the young plants will perish before the crop is established. On light, sandy soils this preparation is a comparatively simple matter.

It will pay to make the conditions for germination and early growth as favorable as possible. It is better, ordinarily, that the preceding crop should be one that will prevent the growth and development of weeds, and the destruction of weed seeds, and in our experience there is no better crop to precede the seeding of alfalfa than oats and peas or early potatoes. These are renovating crops, and are seeded early in spring and may be harvested long enough before it is necessary to seed the alfalfa to enable the soil to be thoroughly prepared and to destroy many weeds that would otherwise be a menace to the young alfalfa plants.

Fertilizers and Manures.

Where the soil is not naturally good, artificial plant-food must be provided, and in abundance, for alfalfa is a perennial crop, and the best time to prepare for feeding is before it is planted; the surface soil should be full of available mineral food. It is our experience also that commercial fertilizers are much better for this purpose than yard manures, unless the manures are free from weed seed, and the land lacks humus.

The importance of vegetable matter in soils is quite as great in growing alfalfa as in the growing of any other crop from the standpoint of increasing their absorbing and water-holding power, but it is possible to grow alfalfa on light soils, without the addition of more vegetable matter than is necessary to provide for a proper medium for the development and growth of the bacteria necessary, in order that the plant may exercise its functions of absorbing nitrogen from the air, providing there is an abundant supply of phosphoric acid and potash.

Where soils are deficient in vegetable matter, and manures are easily obtained and cheap enough, they should be preferably applied to the preceding crop, in order that they may be thoroughly incorporated with the soil, and many weed seeds destroyed, if applied at time of seeding, well rotted manures are preferable to fresh manures. The chief fertilizer constituents required are phosphoric acid, potash and lime, and all of these should be used liberally, more especially on poor soils.

It is our experience, that even mixtures of ground bone, acid phosphate and muriate of potash are the cheapest and most useful forms of fertilizers to use; the rate of application depending upon the character of soils, which may range from 600 to 800 lbs. per acre, on poor soils, to as low as 400 lbs. upon good soils. These fertilizers should be broadcasted and thoroughly mixed with the surface soil, previous to seeding.

The bulk of the phosphoric acid and potash should be applied broadcast after plowing, and well distributed in the surface before seeding; after the fertilizers are so applied, the lime may be applied and also thoroughly mixed with the soil. Just before seeding, a dressing of complete fertilizer, containing a small amount of immediately available nitrogen, is usually advantageous, in order to aid germination, and also that the plant may not suffer hunger for nitrogen during the period when it is unable to gather it from sourcesoutside the soil.

The Kind of Lime and Amount to Use.

The amount and kind of lime to apply will depend upon circumstances, remembering that lime possesses many functions, all of which need not necessarily be exercised in the preparation of land for alfalfa. It is essential, however, that the neutralizing effect of lime be exercised in order that the soil may become a favorable medium for the life and development of the organisms which do not thrive in acid soils. The function of lime to convert dormant into active constituents, for example, mineral compounds containing phosphates and potash would, of course, only be effective on soils possessing large supplies of inert plant-food, as clays and loams, whereas these functions could not be exercised upon soils deficient in mineral compounds of this class. The function that lime exercises in improving the physical character of soils is, also, important, improving their texture, making heavy soils more open and porous, and light soils more compact. Neither is the function of lime for acting upon organic vegetable matter, setting free nitrogen, so important in the case of leguminous crops, as cereals, because the plant is not dependent upon soil nitrogen, and therefore any effect of lime which would result in a too rapid development of available nitrogen would discourage, rather than encourage, the plant to gather nitrogen from the air, besides making them less absorbent of moisture.

It may be said, as a broad general rule, that the use of lime is mainly for the purpose of neutralizing acidity, improving physical character, and feeding the plant with lime—the latter being a very important matter, as alfalfa is more than any other a lime-loving plant, and enormous quantities are annually removed. Hence, on light soils, which are usually deficient in phosphates and potash compounds, mild or carbonate of lime, would be preferable to the use of burned or caustic lime, although the caustic may be used quite as

safely upon soils of a heavy character, where it may exercise the function of setting free mineral plant-food. Experience and experiment, both unite in showing that there is no real danger that an excessive amount of lime will be used. I think that as to lime a safe guide as to the kind to buy is the cost per unit of actual lime, whatever may be its kind. We do not yet know as much as we ought about lime, but what we do know leads me to believe that whether we use lime from pure limestone, from magnesia-limestone, from oyster shells or shell marks, either burned or ground, will depend upon what actual lime costs us delivered at the farm—nearly all costs too much at present.

Jos. E. Wing, than whom no other is a safer guide, recommends at least 4 tons of carbonate of lime per acre, and prefers 8 tons, and says that wherever lime is used in sufficient quantity, not only is the growth of the plant itself encouraged, but weeds very detrimental in securing a permanent stand, as for example summer grass and crab grass, are practically eliminated. His recommendation is to use the ground limestone in preference to the burned lime. Our experience shows that the burned lime, at the rate of one ton to the acre is good, but that two tons are better, which would correspond with about 4 tons of the carbonate of lime. I think that the caustic lime would probably be much more effective on soils that are not naturally of good physical character than the mild or carbonate lime—in other respects I quite agree with the recommendations of Mr. Wing.

Inoculation of Soil.

Another point which is of very great importance, and which probably was, in early experiments, the cause of many failures to secure a stand, is the question of soil inoculation. This is absolutely essential, more particularly on light soils, and upon those that have not been heavily manured, or are not in good condition. Many experiments show that it is not wise to take any chances on this point, particularly with first seedings, even though all other factors essential in the securing of the crop are observed. We have had so many examples of this that I wish to emphasize it. In one experiment carried out a few years ago on land that possessed all the essential characteristics of a good alfalfa soil, being naturally rich, in good tilth, and capable of growing large crops of potatoes, corn and hay, failed absolutely until soil from an old alfalfa field was used for inoculation, after which good, permanent stands and enormous crops were secured. The crop is now a standard one on that farm, and the practice such as to make farming operations much more profitable; all accomplished by a little soil, loaded with alfalfa bacteria.

While the pure cultures of the alfalfa bacteria may be obtained from the Government and private concerns, our experience shows that one of the safest and easiest methods of inoculating the soil is to use the soil from an old alfalfa patch, which already possesses the characteristic nodules. The amount of soil required is not definitely known, but our recommendations of 200 lbs., either mixed with the seed and then sown, or sown broadcast, preferably in the evening, and immediately harrowed in, so that the bacteria may not be destroyed by the hot sun, is sufficient to supply the needed organisms, which will multiply rapidly under favorable conditions, after a field is once in-

oculated. The inoculation of the remainder of the farm may be accomplished by simply distributing the manure made over the different parts of the farm.

Another method of introducing the germs is to mix with the regular grass seedings one to two pounds of alfalfa seed, which will also assist in introducing the proper bacteria. This method has been practiced with success, and is much cheaper and quite as safe as the use of soil.

Seed and Seeding.

Another point of great importance is to secure good, clean seed, free from weeds, as one of the worst enemies of the alfalfa plant in its early growth, is weeds. The amount of seed may range from 20 to 30 lbs. per acre, and it is our experience that 30 lbs. will be better than any other quantity, since it is the natural tendency of the plnats to disappear—the thicker the seeding at first, the longer the period during which profitable crops may be grown.

As soon as the stools begin to die out, then opportunity for grass and weeds comes in, and unless heavily seeded at first, the crop will not last more than three or four years. Too little seed has been the cause of many failures.

Time of Seeding.

The time of seeding for the Eastern States, as already pointed out, has been found to be the early fall, preferably from the middle to the end of August, depending upon the location. The advantages of fall seeding are, first, that should conditions be unfavorable, and a catch not secured, the farmer does not suffer the loss of his land—another crop can be seeded in spring—whereas, if seeded in spring, and conditions are unfavorable (as they usually are in our Middle States, more particularly in their Eastern portions), the loss of land ensues, as ordinarily the farmer hopes that the crop may be successful and continues it throughout the season, thus losing the entire use of the land. If seeded at this time, on well prepared and well fertilized land, it should make a growth in the fall of 6 to 10 inches, which will have sufficiently rooted to prevent its being heaved out by the frost, a condition not ordinarily dangerous, except where lands have not been well prepared, or are insufficiently limed or fertilized.

All our experiments, and the experience of growers in our State, unite in recommending that alfalfa should be seeded alone. A nurse-crop of oats or barley, which is recommended by many growers, particularly in the west and north, where seedings are more often made in spring, seems in the east to be a detriment; the power of the cereal to gather food and moisture being relatively greater than for alfalfa, results in the destruction of the young and less vigorous alfalfa plants, and those that survive are destroyed if the nurse crop is not removed early enough and hot, dry weather follows.

Period of Cropping.

The period during which alfalfa may yield a profitable crop, will depend upon a number of conditions, one of the chief of which is the handling of the crop during its cutting season. That is, the crop should be cut when at the best stage for forage, and not allowed to

mature too far, as the matured crop usually reduces to some extent the vitality of the plant and consequently shortens the period during which it may be profitably grown.

Our experience shows that upon good soils, the crop will last from four to seven years—on lighter soils from three to five years, and possibly three years on light, sandy soils would be a better length of time than any longer period.

Wing recommends that the crop be cut as soon as the new buds appear on the stems near the ground. This suggestion was not made until recently, and our guide previous to this recommendation was the appearance of the blossoms, the crops being cut when about one-third to one-half of the plants were in bloom. The character of the season will influence to some extent this blossoming, as well as the appearance of buds, and it requires careful observation on the part of the grower that it be harvested at just the right time, a factor which affects both the quality of the hay and the period of profitable cropping. The period of growth also influences to a considerable extent the quality of the hay—if allowed to mature too far, the stems become too hard and woody, are not palatable, and hay is not entirely consumed. Besides, there is danger of loss of leaves, if allowed to stand until those on lower portions of the plant turn yellow.

Ordinarily, in our climate, the crop can be cut from three to four times, although in no case should the last crop be harvested so late as to prevent a growth of 8 to 10 inches before winter. If the crop goes into the winter without a top, there is much danger of loss of plants, especially if the land is not covered with snow.

Harvesting for Hay.

While alfalfa is somewhat difficult to cure, we have not found it more so than red clover. It should be cut in the morning, after dew is off, run over with a tedder early in the afternoon, to remove any water and admit air and heat, and raked and put into small cocks before night. The cocks may be thrown out early next morning, tedded once or twice, and again cocked, if not dry enough to haul to barn. Throw out again the next morning, and then haul in. By this method of handling the alfalfa when in the wilted stage, the leaves are not lost, and the bright green color and the aroma are retained. If the weather is catchy, the cocks should be covered with hay caps to prevent injury from rain or dampness. The cocks should not remain too long in one place, or the plants under the heaps will be injured, if not killed. Many farmers with large areas do not cock at all, but rake and cure in windrows, bunching the hay with rake, and hauling directly to the barn. This method, while it does not make so high a quality of hay, saves labor and avoids any possible injury to the plants from the standing cocks. If care is taken to remove all adhering water, the hay can be safely put in the barn, when still containing considerable moisture.

The After-Fertilizers.

Fertilizing the crop after seeding is also important, not only increasing the yield, but extending the period of profitable cropping. In our experience, the use of commercial fertilizer is preferable to yard manure, provided, in the first place, the land is good and the

crop is allowed to go into winter with cousiderable top, as the manure is usually a carrier of weed and grass seed, and the latter is quite as bad, if not worse, than ordinary annual weeds, the former of which may be kept down by continuous cutting, while grass is rather encouraged in its growth, and grass of any kind will surely and effectually crowd out the alfalfa.

We use an annual dressing of a mixture of 150 lbs. acid phosphate and 50 lbs. of muriate of potash, applied at the rate of 200 to 400 lbs. per acre, depending upon the character of soil applied, just after the first cutting, or just before the last cutting. The amount should not be stinted as we must remember that enormous quantities are carried off in a comparatively short time. If we could see the growth of one year in one crop, our ideas of the plant-food requirements would, I think, be clarified—we have obtained, by actual measurements, in one season's crop a total height of 8 feet. We also lime the growing crop once in three years, unless very heavily limed when seeded.

Enemies.

Thus far the growers in the East have not encountered any serious difficulties in the way of insect pests and diseases, although there are many things to watch for and contend with in the way of blights and diseases. These we must be prepared for, and be ready to use preventives as well as corrective measures. The chief thing is to be watchful, careful in all the processes as pointed out, from the selection of the seed to the final feeding of the crop. Be posted in all particulars.

The Value of the Crop.

Alfalfa is a most useful plant, both for soiling and for hay, and under proper management also makes an excellent pasture for all kinds of live stock. There is no crop that is superior for soiling; it is palatable, rich in protein, practically a balanced ration, and the cuttings can be so arranged as to provide a continuous supply from June 1st to Sept. 15th. In using for forage, it is preferable to have it slightly wilted before feeding.

As a hay, it is one of the most generally useful and most valuable —much superior, as already pointed out, to clover or mixed grasses. and may be profitably substituted for concentrated feeds, and while it is possible to make a balanced ration from alfalfa and corn silage alone, and also one which is palatable, it is better to add to the daily ration three or four pounds of fine feed. An even mixture of corn meal and cottonseed meal, used at the rate of 3 or 4 pounds per day, to cows in full flow of milk, with the silage and alfalfa, seems to utilize the nutrients much better than if only the roughage is used, as ordinarily the bulk required is too great.

The extraordinary yields that may be obtained; the great value of the crop from the standpoint of supplying protein, thus making it possible for the farmer to grow practically his entire supply; its power of gathering nitrogen from the air, which function enables the farmer to build up his soil in nitrogen, and gathering it for crops which are unable to gather it from the air, make it one of the most valuable crops known for the dairy or general farmer.

The CHAIRMAN: Now, gentlemen, don't leave; the meeting has not adjourned; there is a very important article yet to be heard.

The SECRETARY: I hope that everybody who can possibly do so will remain seated. The gentleman has come all the way from Canada to speak to us, and anyone who goes out will miss something that he cannot afford to miss.

The CHAIRMAN: The next topic on the program is "Some Needs of Agriculture" by Dr. H. H. Dean, of Guelph, Ontario, Canada.

Dr. Dean spoke as follows:

SOME NEEDS OF AGRICULTURE.

By DR. H. H. DEAN, *O. A. College Canada.*

The first great need of agriculture to-day is the need of organization and co-operation among farmers. Experience proves that without these the masses are helpless in the hands of the classes. All trades, professions and departments of commerce have their organizations whereby they co-operate for the benefits of the units of the mass. Why ought not the farmer do likewise? He must, if he would receive "a square deal." The co-operative stores of the United Kingdom in 1906 did a business aggregating $300,000.000. with profits of nearly $10,000,000. A speaker before an agricultural organization in Canada said: "At present many commodities cost city consumers double the price which the producer received for them. By bringing the two parties into direct relationship much of this waste should go to reduce the cost of living on the one hand, and to increase the profits on the other."

How organization and co-operation works out to the advantage of the farmer was illustrated at this same meeting where a farmer gave the following account of a co-operative association in Kent County, Ontario, Canada.

"Some few years ago," said Mr. Laird, "the farmers of our section of Kent were being paid a very much lower price for their beans than was being paid in Chatham, and for grain the prices were a long way below that ruling in London. A co-operative association was formed with an authorized capital of $35,000 and $14,000 paid in. The co-operatives erected a building through which arrangements were made for handling produce in co-operative way. That was five years ago. In the year ending the first of August last the Association handled 60,000 bushels of beans, 135,000 bushels of barley, 149,000 bushels of oats and 70,000 bushels of wheat. That was a total of over 400,000 bushels. The figures represent the average volume of trade carried on in the last five years. On the average farmers have obtained for the grain and beans so handled at least six cents a bushel more than they would have obtained without co-operation. That is equal to $24,000 per year. This means that in the five years they are, with an investment of $14,000 $120,000 further ahead than they otherwise would have been. That

is not all. As an additional result a private firm of grain dealers has been compelled to pay the same price in the same neighborhood, and as this firm has handled as much produce as the co-operative association has done, the farmers in that section are really over $40,000 a year to the good as a result of the organization of the co-operative company."

How lack of organization and co-operation works to the disadvantage of both producer and consumer is well illustrated by a Canadian Agricultural Newspaper man. We give his own words.

"The ———————— expects to have one hundred Farmers' Clubs organized in Eastern Ontario before the end of January. No movement started has created more widespread interest than the one being agitated at the present time advising the farmers to put their heads together and do their business in a co-operative way. Discussing this matter with a representative of ———————— the other day a big wholesale dealer said: 'If the farmers become organized, it simply means that many of those blood-suckers will have to close their doors.'

"A truer statement than the above was never uttered. There are far too many middlemen doing business in this country. They live on the best and wear the best, and the poor farmer keeps them up. If there were not so many grafters and sharks between the producer and the consumer the farmer would get considerable more money for what he has to sell, and he would be able to buy what he has to purchase at much more reasonable prices.

"For argument sake let us deal with a consignment of butter. The other day the merchants in one of the thriving villages here in Eastern Ontario were paying the farmer 22 cents per pound in trade for butter. As a result of having to take trade the farmer did not actually receive more than 20 cents per pound. The merchant in turn sold the butter to another middleman for 23 cents per pound. The middleman in turn sent the butter to a wholesale house in Ottawa and you may bet your last dollar that he got a rake-off. The big wholesale house in turn sold the butter to the retail grocers at a profit, of course, and to-day the citizens of Ottawa are paying 30 cents per pound for it, or 10 cents per pound more than the farmers realized. The farmer did all the hard work and for his labor he got 20 cents per pound. The middleman charged him 10 cents per pound or half what he got for finding a customer."

The foregoing are actual facts because the newspaper man followed the butter from the time it left the farmers' hands until it crossed the retail counter.

The second need we shall mention is that of freedom from tariff burdens. The burdens of tariff in the form of Customs Duty fall largely upon the consumers. As farmers form the bulk of the consumers on the North American Continent, they have to carry the big end of the stick. A Canadian thinking farmer, discussing this question said, "truly the farmer is an ass crouching between two burdens—the protective tariff on one side and the bounty-fed industries on the other."

There are signs that the farmers are waking up. The farmers of Canada by laying their case strongly before the tariff commission undoubtedly prevented an increase of from ten to twenty-five per

cent. on the "protection" given to the Agricultural Implement Manufacturing Industries. They also prevented an increase of a similar amount in the woolen duties. In both cases, had not a strong protest been made by the farmers, the price paid for agricultural implements and woolen goods would have been increased considerably.

We are pleased to see that in the United States men who are not farmers are pointing to the injustice of the tariff. American farmers, however, seem very apathetic on the question. We read the following account recently in an American paper: "Mr. Chas. Francis Adams, before the House Ways and Means Committee, divided protectionists into two classes—thieves and hogs. The tariff thieves—among whom Mr. Adams classes himself—are those who philosophically avail themselves of the license to steal which the present rates give them under the broad seal of the United States. The tariff hogs, are those who, not content with the scope of their license, are clamoring before the Ways and Means Committee for an upward revision of the schedules. These rush squealing and struggling to the great Washington protection trough, and with all four feet in it they proceed to gobble the swill."

We read further that the great steel-magnate Carnegie says that the steel manufacturers need no further protection. To many this looks as if "the stand-pat fetish seems to be tottering to a fall." When on top of this we are told that one of the great agricultural implement manufacturing concerns of the U. S. announce that they no longer need "protection," it looks as if the farmer might be relieved of some of his burdens sooner than he had hoped for. These are favorable signs of the times, but it would be too much to expect that the robbers of the farmer would desert or that the hogs would cease eating the "swill" from the protection trough, without a strong effort on the part of farmers to stop the thieving or to prevent the hogs from swilling.

Closely connected with the foregoing is the need for the farmers to be more directly represented in all legislation pertaining to the farm. In too many cases farming constituencies are represented by men who have little or no interest in farmers—except to get their votes at election time. In consequence of this, farming interests are woefully misrepresented in the legislative halls of the North American Continent. Six farmers elected to the Parliament of Canada recently, yet our population is overwhelmingly a farming population! Is this not enough to make farmers stop and consider?

More direct interest in, and control of, agricultural institutions by farmers is another need. Too often when a vacancy occurs, which ought to be filled by a farmer, the politicians appoint a life insurance agent, a storekeeper, a lawyer, or somebody else to the post who has been a good party worker, but who has about as few qualifications for the position as a man could have and "hold the job." Farmers, these things ought not to be! We think also that it would be better if the men and institutions connected with agriculture were located more frequently in an agriculture atmosphere and environment. In order to obtain a proper viewpoint and to get in touch with a subject, a man must be in direct contact with the things he would serve. When a novelist wishes to write a story with reference to any country, or subject he goes to that

country, or farmiliarizes himself with every phase of the question about which he proposes to write. He thus gets the proper viewpoint and breathes an inspiring atmosphere. So with reference to agriculture. Instead of having the men and the institutions who are supposed to lead agricultural thought and practice, located in a city, with city environment and atmosphere which tend to give wrong agricultural impressions, these men and institutions ought to be located so far as possible on the farm. If this were done we should have fewer impracticable ideas from leaders, or supposed leaders, in agriculture.

My last point is that we need more agricultural education of a scientific and practical nature. Here again is a weakness in agricultural methods of teaching. Frequently the men who are teaching agricultural subjects lack the farm training which is essential for a proper viewpoint, hence many farmer's sons are dissatisfied, with the teaching given at Agricultural Colleges. It is too theoretical they say—and with some justice. We should be inclined to say that no one is competent to teach agriculture who has not breathed the very smell from the soil, respired the air of the stable, and lived in the farm house, until these have become a part of his very being.

The agricultural education of the future, it seems to us will proceed along two distinct lines—a scientific training based on actual practical farm experience for expert agricultural scientists; and a practical training based on scientific principles for the man who expects to make his living out of the soil. Too many Agricultural Colleges are trying to combine these two with the result it is not satisfactory to either class of students.

The CHAIRMAN: Now, gentlemen, it is almost time to adjourn; is there any further business to be brought before the session before we adjourn? I will say that this evening there will be a joint session of the State Board of Agriculture, the Stock Breeders, and the Dairy Union. Is the Committee on Resolutions ready to report?

MR. DORSETT: Not quite; we will be ready by this evening.

The CHAIRMAN: A motion to adjourn is in order.

On motion, duly seconded, and regularly carried, the meeting adjourned until 7.30 P. M.

Wednesday, January 27th, 1909, 7.30 P. M.

Mr. McHenry in the Chair:

The CHAIRMAN: I want to say to the audience that I feel out of place in occupying this position, and I think there was a mistake made in putting me in. I think the office should be passed around.

We have a very full program, so we will proceed at once to business. Dr. Hunt will not be with us; another gentleman, whose name I do not know, will take his place. This is a joint meeting of the State Board, the Stock Breeders, and the Dairy Union, and as I understand it, a joint meeting with equal privileges. I am sure I don't know why the President of either the Dairy Union or the Stock Breeders does not preside this evening. I shall be glad to retire in his favor.

The SECRETARY: I understand that there was a tacit agreement that the Chairman of the State Board should be the presiding officer this evening.

MR. HERR: I think it is entirely proper for the Chairman of the State Board to preside; there is quite a lot of unfinished business on hand to dispose of.

The CHAIRMAN: I take pleasure in introducing Mr. Noll, who will take Dr. Hunt's place; he will introduce his own subject.

Mr. Noll spoke as follows:

EXPERIMENTS WITH CORN AT THE PENNSYLVANIA AGRICULTURAL EXPERIMENT STATION, 1908.

By C. F. NOLL, *Assistant in Agronomy, State College, Pa.*

I have been asked to give a brief account of the experiments with corn conducted at the Pennsyvania State College Experiment Station in 1908.

These consist for the most part in (1) a test of the yield and adaptability to our conditions of a number of varieties, and (2) an attempt to improve some of these varieties by the ear row method of breeding and selection.

Nine varieties were grown at the Station this year, of which only one was from home grown seed. The other varieties were chosen because they were for the most part fairly early maturing and had done well elsewhere I might say that the Station is not in an especially favored corn growing section. The soil is a clay loam, just as we have in the Cumberland Valley and other limestone valleys of the State, and the soil of the Station farms is in a good state of fertility. The yield has probably reached in some years 100 bushels shelled corn per acre. However, the altitude is about 1,200 feet, and so our season is a little shorter and our nights are cooler than places of the same latitude in eastern or western ends of the State. For these reasons only early maturing varieties can be grown successfully. The White Cap Dent Corn has been grown there for years, and is well acclimated. No systematic effort, however, has been made to improve it, and it is non-uniform.

In the table which is shown here there are given the varieties tested, the length of the season they required in 1908, the area of the plats, and the yield of corn and of fodder per acre. By a bushel is meant 70 pounds, and the yield is based, of course, on the weight of the corn when husked. The plats differed greatly in size, the size being varied to suit the number of ear rows in some of the plats. These varieties were grown in the same field except the Pride of the North. The soil was apparently fairly uniform, but there were no check plots used. The varieties were planted May 27th and 28th except Pride of the North, which was planted the 30th. The rows were $3\frac{1}{4}$ inches apart and the corn was planted in hills about 3 feet apart.

The first variety, Ninety day Clarage matured with us in about 120 days. The seed was grown by C. D. Dobbins and Sons, Cedarville, Ohio. It yielded 61.3 bushels corn and 3,339 lbs. fodder per acre. This is a small yellow dent variety. The stalks are tall and thin and the ears are carried high.

Early Golden Dent matured in 120 days. It yielded 71.8 bushels corn and 3,669 lbs. fodder. The seed of this variety was procured from G. A. Trimmer, Mechanicsburg, Cumberland Co., Penna. It is small yellow Dent variety. It has very deep grains and many ears yield as much as 90 per cent. shelled corn. The yield you see is good for this season. An objection to this variety is the rough dent.

This White Cap Dent is the variety I mentioned as being the only one that could be considered as being thoroughly acclimated. It matured in about 115 days and yielded 72.2 bushels of corn and 3,097 lbs. of fodder per acre. The ears are irregular both in shape and color and the cob is large.

Early Huron Dent matured in 115 days. It yielded 76.6 bushels corn and 3,041 lbs. fodder per acre. It promises to be a valuable variety with us. This is a well known variety of yellow dent corn grown in New York state. The seed was grown by the Joseph Harris Seed Company of Coldwater, Monroe Co., New York. Coldwater is about 20 to 30 miles south of Lake Ontario.

Pride of the North seems almost identified with Early Huron Dent, though the yield is much less. However, it was not grown with the others and so the yields are scarcely comparable. It matured in 115 days and yielded at the rate of 49.9 bushels corn and 2,086 lbs. fodder per acre.

The Yellow Flint is a typical eight rowed yellow flint variety. It matured in 115 days and yielded 77.2 bushels per acre, and 2,086 lbs. of fodder. This is the best yield of corn of the varieties that ripened, but it is accompanied by a very low yield of fodder. This corn has too large a cob and yields only about 76 per cent. shelled corn. Seed was grown by J. M. Welch, Orangeville, Columbia Co., Penna.

The next variety we call J. A. Beck corn, because we procured the seed from Mr. J. A. Beck, White Deer, Union Co., Penna. It is a very light yellow dent corn with a white cap. It is almost white in fact. It is of a larger type than any of the preceding varieties and later in maturing. The period of maturity is given here as 125 days, though really some ears never fully ripened even though the grains dried out enough to keep. The cobs of this variety are too large and the ears are too conical. The yield is 88.2 bushels corn per acre and 4,537 lbs. fodder.

Neither of the last two varieties matured. Their length of season is marked as over 130 days. These varieties actually stood for about 130 days and they were caught by a slight frost. During the last two weeks the nights were cold and the corn ripened little. I should add that our first frost was later than usual. The seed of the variety called Dunlap was grown by W. S. Dunlap, Walnut Bottom, Cumberland Co., Penna.

The Reid's Yellow Dent seed was secured, I think, from C. D. Dobbins and Sons, Cedarville, Ohio. Dunlap yielded 85.1 bushels of

corn and 5,163 lbs. fodder. Reid's yielded 76.6 bushels corn and 5,459 lbs. fodder. As neither of these varieties were ripe, these figures do not mean much.

I gave the sources of the seed chiefly to call your attention to the effect on the variety of the bringing into a new locality. The season with us was marked by the wet weather in May which delayed the planting, then the drought in August and September and the lateness of the first frost. Most of the localities from which the seed came experienced the same conditions. In nearly every case the varieties brought from a distance required a longer season at the Station than the same variety required in the locality from which the seed came. Thus the Early Huron Dent, the Harris Company wrote us, matured in 100 to 105 days with them in 1908. At the Station it required about 115 days. The Early Golden Dent required at the Station 120 days while this same strain ripened for Mr. Trimmer at Mechanicsburg in less than 90 days.

The Yellow Flint, though it ripened well at the Station, required about ten more days to mature than did the same strain in Columbia County. The Ninety-Day Clarage and Reid's Yellow Dent were brought from Ohio and this was a pretty radical change of conditions. Both of these varieties required a longer season at the Station than in Ohio. Of course, the same variety might not be affected the same way in other years by the change of locality.

These are the results of only one year's trial and are given for what they are worth. It would be unfair to utterly condemn any of these on account of these results. Even those that failed to mature could probably be adapted to our seasons in a few years by careful selection.

These varieties were mostly planted by the ear-row method, but the ear rows were not kept separate in harvesting some of the plats. The larger plats had either 50 single ear rows or 25 double ear rows. By a double ear row is meant two ear rows planted from the same ear. We found the usual variation in yield of these ears. In the White Cap Dent plat the yield of the ear row varied from 62 to 95 bushels shelled corn per acre. In the chart which I have here the variation in yield of the ear rows in the Ninety-Day Clarage plat is given. There were 50 ear rows about 320 feet long. In the upper part of the chart are represented the yields of the first 25 rows and in the lower part the second 25 rows. The vertical lines represent the ear rows, the horizontal ones the yield in bushels per acre, and the broken lines represent the variation in yield. Thus row 1 yielded at the rate of about 59 bushels per acre, row 2 about 54 bushels per acre, row 5 about 71 bushels per acre and so on.

Rows 19 and 20 yielded extremely low, but they were partly in a dead furrow. Likewise rows 32 and 45 to 48 inclusive gave very low yields, but these rows for some reason had poor stands. Leaving out these rows then, the chart shows a variation in yield of from 52 bushels in the case of row 14 to over 75 bushels per acre in the case of rows 16 and 35. For next year's plat we chose seed from the high yielding rows, such as 5, 7, 16, 26, 30, 33, 34, 35.

It is a good plan to make a duplicate test of the ears, which we did not do. I have here a chart showing the results of a duplicate test of ear rows made by F. C. Snyder, Sandusky, Ohio in 1904.

Here are shown the yields of 25 rows in duplicates. The high yielding rows in the first plot were in general high yielding in the second, but there are some disagreements.

The ear rows at the Station showed their individuality in other ways besides their yields of corn. Some rows had over 12 per cent. of the stalks attached by smut while others had less than 1 per cent. Then the percentage of barren stalks varied from over 20 per cent. to less than 5 per cent. Whether these tendencies are transmissible has not, I think, been proved. There were also noticeable differences in the length of the stalks and position of the ear. As to the position of the ears, actual measurements in one plat showed a variation in mean height above ground of from 2.8 feet in one ear row to 4.2 feet in a neighboring ear row where the ear rows had practically the same number of stalks yielded nearly the same amount of corn.

When some of the parent ears of the White Cap Dent were selected last year, a note was made of the husk, as to whether it was long or short. It was found in the ear rows that the bearing of long or short ears was transmissible. Husks were considered long if they came together to a point over the ear, and they were considered short if only as long as the ear, or shorter. There were over twice as many ears with short husks from the parent ears with short husks, as from the parent ears with long husks.

These studies showed that in this year's selection the corn was modified in length of stalk, heighth of ear, and form of husk. These variations offer an opportunity for selection along different lines.

MR. BLYHOLDER: Any difference in the vitality of the white and yellow?

MR. NOLL: No; I don't think there was.

MR. HERR: How was the quantity arrived at?

MR. NOLL: Well, it was this way; we knew the number of ears and the quantity per ear.

A Member: When was the husking?

MR. NOLL: In September.

A Member: That was too late.

MR NOLL: Yes; the actual yield of dry corn would be considerably lower—perhaps 80 per cent. below the figures I gave.

MR. STOUT: How about planting it with drills?

MR NOLL: There was some experiment at the Illinois Station along that line, but they found when they had the same number of stalks to the hill it did not matter whether it was drilled, or planted in the ordinary way.

MRS. BETTS: Would it not make a difference in the pollenization if they are planted so far apart?

MR. NOLL: I don't think it would.

MRS. BETTS: I know it makes a great difference in sweet corn when planted so far apart; it does not mature because not pollenated enough.

MR. NOLL: I have never noticed that; usually it matures all right.

A Member: Do you expect to keep it up, planting in alternate rows instead of in plats?

MR. NOLL: We did not detassel this year, but we expect to do it next year. Out of these rows shown you we selected about eight.

A Member: Have you any analysis that shows the difference between close planting and white planting?

MR. NOLL: I think there are some statistics, but I cannot give them to you.

MR. HOLMAN: Do you get just as good results from the drill planting as from the hill planting?

MR. NOLL: These two plants have not been tried up at the College so as to gather statistics.

A Member: How do you account for the smut?

MR. NOLL: Well, it gets on the corn just the same as it does on wheat, but I don't think there is any thing to prove it.

MR. RODGERS: Do you think it is transmitted in the seed?

MR. NOLL: There is a theory that it is, but I don't think it is; more likely outside the seed.

MRS. BETTS: Is it due to the dampness of the Spring?

MR. NOLL: No; it is worse some years than others, and the chances are that some of the corn will be carried over to the next year, and it will appear again.

The CHAIRMAN: As I said before, this is a joint meeting of the three organizations, and I would be very much pleased if the President of the Breeders' Association, or the President of the Dairy Union are present to have them come forward and take the Chair. I would like to divide up the honor of presiding.

MR. BAYARD: These gentlemen are not present, and you are doing all right. I would like to announce the corn prizes now, if you don't mind.

Mr. Bayard read the Corn Prizes, which were as follows:

FLINT.

1. 31, J. H. Ferris, Little Marsh.
2. 77, Harry Rockwell, Canton.
3. 127, Jas. C. McCann, Fredonia.
4. 142, J. H. Bestwick, Jackson Centre.
5. 30, Oliver D. Spencer, Wellsboro.
6. 123, C. E. Brown, Alderson.
7. 19, J. H. Bowman, Towanda.
8. 45, J. D. McKnight, Bakerstown.
9. 83. C. F. Reynolds, Tioga.
10. 75, John J. Ayers, Gilbert.

MIXED VARIETIES.

1. 65, G. W. Tilton, Claysville.
2. 98, S. E. Musselman, Allen.
3. 21, A. B. Grove, Chambersburg. (This name appears on the paper wrapped about the corn; no other mark of identification).
4. 48, Harry B. Herr, Lancaster.
5. 103, Paul M. Bitner, Shermantown.

GRAND CHAMPION.

Best Ten Ears in the Show.

George G. Strosnider, Waynesburg.

Best Ear in the Show.

Jesse L. Eisiminger, Waynesburg.

YELLOW DENT.

1. 62, George G. Strosnider, Waynesburg.
2. 52, G. Martin Cloud, Kennett Square.
3. 64, Jesse L. Eisiminger, Waynesburg.
4. 132, J. R. Fritz, Duncannon.
5. 68, William H. Grim, Hamburg.
6. 57, C. B. McConnell, Sharpsville.
7. 5, Clarence Mellinger, Ronks.
8. 110, J. B. Henderson, Burgettstown.
9. 73, Harry E. Dietz, Mechanicsburg.
10. 70, C. L. Taggart, Washington.

WHITE DENT.

1. 23, Charles A. Row, Langhorne.
2. 23, G. A. Trimmer. Mechanicsburg.
3. 109, L. W. Kintigh, Irwin.
4. 95, Lee L. Trimmer, Mechanicsburg.
5. 111, C. H. Deckard, Newport.
6. 99, S. E. Musselman, Allen.
7. 26, W. M. Thompson, Uniontown.
8. 10, Evan R. Styer, Glen Moore.
9. 76, Geo. O. Souder, Dillsburg.
10. 152, A. C. Slifer, Lewisburg.

WHITE CAPPED DENT.

1. 88, J. P. Dentler, Turbotville.
2. 59, A. T. Holman, Millerstown.
3. 49, Harry B. Herr, Lancaster.
4. 22, Charles A. Row, Langhorne.
5. 153, A. C. Slifer, Lewisburg.
6. 25, Jasper M. Thompson, Uniontown.
7. 91, Jos. W. McCann, Fredonia.
8. 29, H. M. Welton, Sandy Lake.
9. 13, F. W. Levis, Chadd's Ford.
10. 79, Estate Samuel J. S. Sharpless, Westtown.

NINETY DAY TYPE.

1. 28, Post Brothers, West Alexander.
2. 47, G. Martin Cloud, Kennett Square.
3. 124, B. F. Gabler & Son. Greensboro.
4. 94, G. A. Trimmer, Mechanicsburg.
5. 2, Harry C. Trexler, Allentown.
6. 122, T. G. and W. A. McCoy, Mercer.
7. 141, W. T. Phillipy, Carlisle.
8. 101, J. H. Allison, Mercer.
9. 44, Anna C. Betts, Buckmansville.
10. 118, Fred. Backhaus, DeHaven.

MR. HERR: I move that we hear the report of the Committee on Resolutions.

This motion was properly seconded, and duly carried in the regular way, and the Committee on Resolutions reported as follows:

REPORT OF THE COMMITTEE ON RESOLUTIONS.

Members of the State Board of Agriculture; Gentlemen: Your Committee on Resolutions submit the following for your consideration:

We point with pride to the work that is being done by the Department of Agriculture. We compliment the Secretary upon the success of this meeting and believe that his policy of having the allied interests of Agriculture meet in joint session is correct, and that beneficial results will follow.

Under the wise direction of Deputy Secretary Martin, the Farmers' Institutes of this State have been placed upon a high plane of excellency and efficiency, and have become the means of disseminating much valuable information among the farmers of this State.

We heartily approve his method of conducting the Dairy School, and his plan of bringing the farmer in direct contract with the Movable School of Agriculture.

As a further evidence of our appreciation of his efforts, we most heartily recommend that the present session of the Legislature grant an increased appropriation of $50,000 to his Department, to aid him in the further extension of this work.

We commend Prof. H. A. Surface for his tireless efforts in his work of destroying the countless numbers of insect pests which prey upon the plant and vegetable life of Pennsylvania. We bespeak for him the loyal support of every member of this Board, in his plan of bringing the result of his experiments directly to the attention of the farmers of this great Commonwealth.

We would also commend the efforts of Geo. G. Hutchison in keeping our Feeds and Feeding Stuffs from being adulterated by unscrupulous dealers. This is an important branch of our work, and should receive the careful attention of every member of the Board.

WHEREAS: The outbreak of the foot and mouth disease recently occurring in the State of Pennsylvania has been brought under control promptly through the efficient direction of the State Veterinarian, Dr. Leonard Pearson, in co-operation with the Federal Bureau of Animal Industry, therefore be it

RESOLVED: that the thanks of this Convention are due to the United States Department of Agriculture for its liberality in appropriating two-thirds of the value of animals slaughtered; to Governor Stuart and Secretary Critchfield for their support of the Livestock Sanitary Board, and to Dr. Leonard Pearson and his associates for their untiring efforts to stamp out this insidious disease. It is further

RESOLVED: That this Convention urge upon the Legislature the passage of the act making an appropriation of $90,000 to the Livestock Sanitary Board for the payment of expenses in the eradication of the foot and mouth disease and for the control of dangerous, contagious and infectious diseases in animals.

We are unalterably opposed to the bonding of our State for $50,000,000, or any amount, for the purpose of raising revenue to build the proposed highway from Philadelphia to Pittsburg.

If taxes were equalized, each class bearing its just share of the burdens of the government, the taxes on real estate would be

greatly reduced, while the taxes on personal and corporate property would be materially increased, thus furnishing sufficient revenue not only to build, but maintain all the State roads, and still meet all the necessary expenses of the Government.

Give us State roads in fact as well as in name, the State to build and maintain them, starting at some central point, and eventually connecting the several counties of the State.

We highly appreciate the efficient and intelligent work that is now being done at State College, under the Presidency of Dr. Edwin E. Sparks and his competent corps of instructors.

Believing that the State cannot spend her money to better advantage than that of educating her boys and girls for future citizenship, we therefore most earnestly recommend that the Legislature make such appropriations, from time to time, as shall place and keep her in the front rank, as an experimental station and an educational institution.

RESOLVED: That we favor the passage by the Federal Government of United States House Bill No. 21,318, known as the Insecticide and Fungicide Bill, providing that the contents of packages of material sold and shipped for use as insecticides and fungicides must be in accordance with the labels placed thereon, in regard to quantity, composition and fitness. Be it further

RESOLVED: That we request the Secretary and the Entomologist of this Board to write to Senator Kittredge, Chairman of the Committee in charge of this Bill, favoring its immediate passage.

WHEREAS: The Quail, sometimes known as the "Bob-White" is known to be a most valuable bird on the farm for its destruction of weed seeds and insect pests, Therefore be it

RESOLVED: That we request legislation providing for re-stocking this State with Quail and protecting this bird by all possible means for a period of at least five years.

(Signed)

E. B. DORSETT,
JOHN C. WELLER,
I. A. ESCHBACH,
S. M. McHENRY,
H. C. SNAVELY.

The CHAIRMAN: You have heard the report of this Committee, gentlemen; what is your pleasure?

MR. BLYHOLDER: I move the adoption of the Resolutions, the recommendations of the Committee to be adopted as read.

This motion was properly seconded, and carried in the regular way.

The CHAIRMAN: We will now proceed with the next number on the program, "Boy's Corn Clubs" by Dr. W. T. Phillipy.

Dr. Phillipy's address is as follows:

BOY'S CORN CLUBS.

By DR. W. T. PHILLIPY, *Carlisle, Pa.*

I want to first express to you my appreciation of the honor and privilege that has been conferred upon me by the Secretary of the Pennsylvania Livestock Breeders' Association, in asking me to appear before you tonight. He wrote me, and asked whether I would talk upon this topic for a few minutes this evening; he did not say how many, and I want to say to you like the good old colored brother, who went to preach a trial sermon in the South. He said, "Now, brothers and sisters, I sometimes preach long sermons, and if any of you get sick or tired, we will excuse you." He preached for sometime, and then noticed that one good old brother, sitting in the rear was becoming restless, so he said "Brother, are you sick?" And the Brother replied, "Yes; I'm homesick." So, if any of you get homesick before I get through with my talk, we'll excuse you.

I want to say to you, ladies and gentlemen, that when I first began this Boy's Corn Growing contest—I was glad the good Secretary read the award of the prizes before I had the floor because a few of them went over to Cumberland County; not very many first class prizes, but we are glad for any good thing over there—when I first began this work two years ago, I spoke of it to my friends, and they rather discouraged me; they said "I don't believe you can make a success of it; I don't believe you can get the boys interested in growing corn." "Well," I said, "I'll try it." I always try to be an optimist. Things sometimes get down almost to the level, but if I cannot be an optimist, I will at least be a hopeful pessimist. Now, you know, there are always some people, who when they can't do any thing else, can see trouble in everything. Like every other county, Cumberland has its quota of Democrats, and you know the old saying, "more corn, more whiskey, more whiskey, more Democrats" and this is what they told us would be the result if we started growing more corn, but those of you who followed the recent election, know there is nothing in that. I don't know what is the next thing they will bring up now, but they have not succeeded in discouraging us yet.

One of my friends in the Cumberland Valley had a thoroughly acclimated Yellow Dent Corn; originally the seed came from Missouri. I secured some of this corn from him, and then put an advertisement in the different papers of the county, asking that the boys of the Cumberland Valley, between eight and eighteen years of age, send me their names and their desire to enter this contest. To all whose names I got, I sent several ounces of this corn, asking them to plant it, fertilize it and cultivate it, according to their judgment, and in the fall we would have a show. Then I went round among my friends, and secured from them, and from the enterprising farmers of the county, twenty prizes, averaging from twenty-five cents to five dollars. When the fall come we had a show,

and had a number of farmers come there and talk to us on growing corn and potatoes and wheat and so on. Out of the boys who had started in in the early spring, about thirty sent in their corn to the corn show. It was really wonderful. You know that the year 1906-7 was a bad year for corn. There was very little corn that really matured. We had some ninety day corn that matured. Of course, many of the boys were prevented from sending in their corn because of its immaturity. Some of the gentlemen are here tonight, so I refer to it with some hesitation, but when some of the farmers saw the corn that the boys brought there, they went out with their heads hanging down.

Last year I had a hundred and twenty boys growing corn. I selected from what they had grown, the best seed ears. Out of that hundred and twenty, about fifty boys exhibited this year. We held our show in Carlisle on the 10th of December, and you would have been surprised to see how pleased those boys were, and how much interest they took in that corn. Prizes were awarded to about thirty of them, I believe, ranging in value from 25c to $5.00.

I don't want to take up too much of your valuable time, but this is what we accomplished. I don't know that there is anything like this Boys' Corn Club in the State of Pennsylvania, but the idea was not original with me. I conceived the idea when I was at the St. Louis Fair a few years ago, and saw what the boys in Illinois did. I was not in touch with the boys in Pennsylvania, but conceived the idea of getting in touch with the boys in Cumberland county, and I feel that if I have done nothing else, I have awakened the interest of these young boys in Cumberland county, that will spread out and awaken interest not only in corn growing, but in Agriculture. You know it has been said here that we must depend upon the young men, they are the coming farmers, and no opportunity must be neglected to awaken their interest. I was glad to hear the President of State College, Dr. Sparks, say this afternoon, that they were going to establish a Summer School in Domestic Science and the Elements of Agriculture, that the teachers might go up there and take the course, and then go back and teach these things in their respective schools. I suppose the only way to accomplish what we wish, is to give them the education. You know the tendency of the past generation has been toward the city, because the tendency of education has been that way. We hope to remedy that now, and get the boys and girls of the State back to the old farm.

I hope that every county in the State will follow the example of the boys of Cumberland county, so that we can get the boys to grow corn and send it down here to the Corn Show at Harrisburg. We may not have more or better corn, but I think we will have done something toward awakening the interest of the rising generation in agriculture. When the boys are interested, they are going to take a course at State College, or other Schools of Agriculture, and that is what we are striving to do—to renew interest in this great work. I tell you, ladies and gentlemen, that the time is coming when the vast beds of ore and coal will be exhausted, and men will turn back to the soil for its vast wealth of fertility, and the result will exceed anything that has been developed by any coal mine or ore bed in the State of Pennsylvania, and it is up to you and to me to

encourage the boys and girls of the State to stay right on the farm, and if we can do that, we will make better farmers, and better farmers' wives.

The CHAIRMAN: The next subject on the program is "Judging Corn" by Prof F. D. Gardner, of State College.

This address is as follows:

CORN.

By PROF. F. D. GARDNER, *State College, Pa.*

Corn (*Zea Mays*), was unknown to the world prior to the discovery of America by Columbus in 1492. It was then cultivated only by a semi-civilized people, the aborigenes of the western hemisphere. Its cultivation, though on a small scale and with such inter-tillage as could be given by a crooked stick is known to have occurred from Maine to Chili. Today this crop is known throughout the world, is recognized as the King of America cereals and is used in more than a hundred ways. Not only is it the great stock food for fattening all classes of animals for market, but it enters largely into the diet of our people. Out of it is made alcohol, starch, glucose, whiskey, malt liquors, oil, dextrim,, cellulose, gluten meal and I might continue the enumeration through the long list, but why should I tax your memory. Out of the husks is made mats and matresses, the pith is used in the manufacture of explosives and for packing the sides of war vessels and the stems are used for making paper. The whole plant as stover or as ensilage is relished by all classes of live stock.

To increase the average yield of corn in the United States one bushel per acre would add sixty millions of dollars to the pocket books of our farmers. To increase the yield of corn in the state of Pennsylvania by one bushel per acre would add to the income of the farmers of the Keystone state one million and forty-four thousand dollars this year. Can this be accomplished? We will all admit that by better preparation of the land, better tillage and a little more thought to our crop rotations that it can.

And still the possibilities are not fully realized. At the present price of corn ten kernels added to each ear produced in the United States would add to the annual income of the farmers of our country forty-five millions of dollars. The same number of kernels added to each ear produced in the State of Pennsylvania would increase the value of our corn crop by 780,000 dollars. Can we increase the number of kernels on the average ear by ten? I am sure that you will answer in the affirmative and I believe that you will agree with me that it would be quite possible through careful selection and breeding of our corn to add an additional ten kernels to each ear for several years to come.

What then are the possibilities of this King of the American cereals, this plant, so plastic in the hands of man, that like wax it can be shaped to suit his fancy and meet his needs.

In judging corn, a thorough knowledge of the crop is essential, together with a familiarity with the various characteristics that go to make up ideal ears and kernels. Since the ideals of men vary, it has been found helpful to design a score card for judging corn. Such cards have been adopted by all of the corn breeders associations, and while those of some associations differ in minor details from those of others, in the essentials they are all much the same. The purpose of the score card is to aid the judges to arrive at a just conclusion as to the relative merits of samples or exhibits of corn. Both practice and sound sense are necessary to enable one to use the score card correctly. If exhibitors thoroughly understood the characteristics called for in the score card, it would doubtless greatly aid them in the selection of ears for exhibition purposes and would tend to raise the standard of our corn shows. All exhibitors should use care in the handling and shipping of corn so that it will not be bruised or shelled. It should be perfectly free from dust or dirt and unbleached by sun or rain. Each exhibit should be plainly labeled, stating in what class it is to compete, and giving the name of the variety, the name of the grower and the locality where grown. Express charges should always be prepaid and the packages addressed to the person in charge of the exhibit, giving the name of hall or place of exhibit, with street and number if in a city so that the express company may deliver to the place of exhibition. The exhibits should be arranged on long narrow tables or benches which are sufficiently low so the judges may bend over each and examine both tips and butts of ears. All samples of one class should be brought together and good light should fall uniformly on all exhibits.

SCORE CARD CLASS G—GRANGE EXHIBITS.

	Perfect score.	Exhibt Number.																
Uniformity of exhibit and trueness to type,	10																	
Market and seed conditions,	10																	
Shape of ears,	5																	
Color:																		
Kernels,	5																	
Cob,	5																	
Tips,	5																	
Butts,	5																	
Length,	5																	
Circumference,	5																	
Kernels:																		
Shape,	10																	
Uniformity,	10																	
Furrows between kernels,	5																	
Space at cob,	5																	
Percentage of grain,	15																	

MR. BLYHOLDER: What is the average depth of these rows?

PROF. GARDNER: I believe about nine inches.

MR. BAYARD: What variety?

PROF. GARDNER: Funk's Strain and Leaming—Gold Standard Leaming.

MR. BAYARD: No; that is the other ear.

PROF. GARDNER: No; the Champion Ear was the Gold Leaming.

A Member: What kind is this?

PROF. GARDNER: The Improved Leaming.

A Member: Some people want the ends and butts shelled; what is that for?

PROF. GARDNER: Uniformity. If the butts and tips are small, they may not have been planted deep enough, but the experiments that have been carried on show that there is no material difference between corn taken from the middle of the ear and from that taken from the butts and tips. The only thing is that those on the ends might be a little smaller and give a little harder spread, but the sum total shows that there is very little difference.

MR WELD: Whereabouts on the ear do you get the corn for the germinating test?

PROF. GARDNER: Five kernels; one about 1½ inches from the butt, one from the tip, three at intervals along the middle of the ear, turning it, so as to get it from different parts of the ear.

A Member: You said it was about nine inches long; what was the diameter or circumference?

PROF. GARDNER: The diameter there is not less than 7½ inches; it runs a little over that.

The SECRETARY: You mean the circumference.

MR. RODGERS: Can you tell us what kind of fertilizer was used on the soil?

PROF. GARDNER: I cannot tell.

MR. BAYARD: As I say it is the Improved Leaming, grown by .....

MR. BAYARD: You don't know how to read it; the seed was grown by J. S. McCoy (?) of Washington county; Improved Leaming, planted the 11th of May; cut the first week in October; fertilizer, manure; kind of soil, sandy loam; original growth, sugar trees.

A Member: Who was the grower?

MR. BAYARD: Geo. G. Strosnider, Waynesburg.

A Member: Do you like a bright cob?

PROF. GARDNER: Yes; I think it is an indication of virtue. I don't know much about it, but in a general way, in a yellow corn, the cob should be red, and in a white corn, it should be all white. We do not run across any yellow cobs.

A Member: A yellow corn is very slow to bleach up in color.

A Member: Are these ears up to the standard in Pennsylvania?

PROF. GARDNER: No; I had to cut them 50 per cent. for color.

The CHAIRMAN: I am sorry to cut off this interesting discussion, but we still have a topic on our program, and the hour is getting late.

MR. PALMER: What is the score of that exhibit?

PROF. GARDNER: I have not got the exact figures, and it does not give them.

MR. PALMER: It would be interesting to know this if we have the time.

PROF. GARDNER: I think it is a little below ninety, whereas for perfection we give a hundred. I want to say here that we have the score adopted by the Breeders' Association; I know all of you are familiar with them.

A Member: In the case of Dr. Phillipy sending out his seed corn to the boys, letting the boys use their own judgment in the cultivation of the corn, does that show the real value of their work?

PROF. GARDNER: Not altogether, because we cannot take into consideration the conditions under which the corn was grown, and it cannot take into consideration the yield, and it may be that the best exhibits so far as the corn was concerned, would not yield the best results per acre. Of course, they are growing the corn for grain, and I can't see why we can't do that as well as for yield.

MR. HOLMAN: Mr. Bayard forgot to state when the corn would be sold.

MR. BAYARD: Tomorrow afternoon.

The SECRETARY: The last item on the program for tomorrow afternoon.

The CHAIRMAN: We will now proceed with the last topic on the program this evening—"Milk Production" by Dr. H. H. Dean, of Guelph, Ontario, Canada.

Prof. Dean spoke as follows:

MILK PRODUCTION.

By DR. H. H. DEAN, *O. A. College, Canada.*

Burke said: "A great Empire and little minds go ill together." You are part, not of a great Empire, but of a great Republic, therefore, I take it we have before us, not men of little minds, but men of broad intellect—fitting bulwarks of a great State and of a great Nation. Among farmers and dairymen we seldom find men of "infinite cleverness who are not always clever," nor those possessing "an inexhaustible fund of self approbation." Rather do we find men of "genuine simplicity of heart which is a healing and cementing

principle." In the new agriculture the farmer is beginning to take his place among the forces which determine the wealth or "illth" of a nation. However, "time is needed for the growth of confidence in the new order of things." The farmer has made and will make many mistakes, but "mankind is helped in its progress almost as much by the study of imperfection as by the contemplation of perfection." As he marches to the front in this 20th century he is bound to make enemies. The man who has hoodwinked him or, lo, these many years! and waxed fat at his (the farmer's) expense will not care to see him pull the wool from his (this farmer's) eyes. Of a great American it was said: "we love and respect him, not only for himself, for his character, for his integrity, judgment and iron will, but we love him most of all for the enemies he has made." When the farmer develops similar qualities, then the public will love and respect him, and at the same time, his enemies will have a healthy regard for his opinion on public questions. Too long the farmer has been looked upon as a "man of limited mentality and easily gullible." An American writer commenting recently on the value of American Farm Products which amounted to nearly eight billions of dollars in 1908, pointed out that this is but an average return per farmer of about $868. He added this significant comment: "Collectively the American farmer is a mighty factor in world finance; singly he is overworked and ill-paid, grossly discriminated against in legislation and not nearly so much in need of commissions on social uplift as of simple justice." In proof of the foregoing we may be allowed to quote a writer in an American Agricultural Journal, who said recently that in Wayne county, N. Y., not one farm in 15 or 20 is occupied by descendants of owners of fifty years ago. These farms are largely given over to immigrants. These are things which ought to cause all thinking men to stop and consider. Whither are we drifting on this outward tide away from the farm? Fortunately, the tide is turning towards the farm and we need to profit by the mistakes of the past. The men who have been guiding the destiny of the North American Continent have made some serious blunders with reference to agriculture. These great men have had some serious defects which must be remedied by the statesmen of the future. It is not enough, as Disraeli said, that "The defects of great men are the consolation of dunces."

The greatest drawback in American agriculture is the fact that farmers are not sufficiently rewarded for capital invested in, and labor spent upon, their farms. This is so because the economic conditions are fixed against the farmer. While I would not have the obtaining of money the highest ideal of an American farmer, it is a necessary factor in the world's progress, though in saying this we may lay ourselves open to the imputation that "the life of one sex is devoted to dollar-hunting and of the other to breeding dollar hunters."

Practical Phases of the Question.

We have dwelt at length on the introduction to my subject because the man is the most important factor in the problem of milk production. In order to succeed in economic milk production a man needs what we may call the "er" (one who does) qualifications. He must be a thinker, reader, worker, breeder, feeder, buyer, seller—in a word, he must be a farmer.

In these modern times it requires more brains and skill to farm, than is needed in any other single calling; and of all the different kinds of farming, dairy farming furnishes most scope for the display of intelligence and skillful work.

A study of soils, crops, animals, machinery, proper direction of labor, wise investment of capital—all these need the highest type of man. No one need fear that his mental or physical activity will suffer on the farm. There is room for the brightest minds on the dairy farm. A knowledge of geology, chemistry, botany, biology, and many other "ologies" is needed, if a man would obtain the best returns from the soil, and from man's agents (plants and animals) for converting soil, sunshine, air and water into food.

The A (Alfalfa) B (Bran) C (Corn) feed problem is one deserving of special attention at the hands of the dairy farmer. The growing of alfalfa and other clovers has been a means of materially reducing the cost of milk production. Bran, oats, oil meal and cottonseed meal furnishes the concentrates, a certain amount of which are essential for the cow to produce a large flow of milk, in an easily digested form and at a price within the reach of most farmers. However, the tendency is to reduce the meal bill to as low a point as possible and aim to produce milk on less expensive roughage, in the form of corn, roots and clover. I need not dwell upon the importance of clover corn and the silo for cheap milk production both summer and winter, when talking to an audience of American farmers, where corn is King and clover is Queen of plants on their farms.

A combination of good corn silage (30 to 40 lbs.) clover hay (8 to 10 lbs.) mangels or sugar beets (20 to 30 lbs.) and meal or concentrates (8 to 10 lbs.) will make a suitable and economical ration for a cow in winter. Grass, corn silage, or some soiling crop together with 2 to 4 lbs. meal daily per cow will maintain the milk flow in summer.

In this connection we need to study very carefully the individual capacity, and profit producing power of each cow. A calculation of the cost of feed per cow and a study of the milk record, will enable the cow owner to calculate whether or not his individual cows are making sufficient profit to warrant the owner in keeping them in the herd. Cow owners need to study individual cows more and not rely too much upon returns from the herd as a whole. Study cows singly —not in masses.

Coming to the cow herself, we believe that a standard is advisable. Different owners have different ideas as to what constitutes a standard of production in a cow. We should say that the minimum of production should be 6,000 lbs. of milk or 250 lbs. of butter and the dropping of a healthy calf every twelve months, throughout a period of eight to ten years. While this may seem a somewhat low standard, when we compare it with the record of the American cow Colantha 4th, 27,432 lbs. milk and nearly 1,000 lbs. fat; or that of the Canadian 4 year old cow Boutsje which gave in one year 20,778 lbs. milk containing 782 lbs. milk fat, yet this minimum standard suggested, is about double the production of "average" cows in both Canada and the United States. How to raise this "average" is certainly a great problem. Cow-testing Associations will help;

the use of pure-bred dairy sires will also help; records of performance will help, but after all it is a question which the individual cow owners must solve for themselves. We have expressed it in the form of a three word proverb—Breed, feed, weed. Breed properly; feed scientifically (i. e., with knowledge); and weed unhesitatingly the unprofitable cows from the herd.

If these points are carefully observed we shall have obtained a great deal of useful information, and at the same time have added to the revenues of the farm by means of milk production reduced to science, which after all, is chiefly common sense.

The SECRETARY: I am sure we have all enjoyed beyond our power to express, the address we have had from our good neighbor from Canada this afternoon, and again the one this evening. He announced in his address this afternoon that he would have to go back tonight, and we want him to feel that we appreciate his coming all that distance to speak to us. I therefore move that we extend to him a rising vote of thanks.

MR. HERR: I would like to second that motion, with a few remarks. I had the pleasure a few years ago of visiting the State Fair at Toronto, Canada. I never was made more welcome anywhere in my life, or treated better, and the advancement in their farming industries surprised me. I came away feeling that Canada belongs by right to the United States, and we should take her in and make her a part of us.

The CHAIRMAN: I inferred from what the gentleman said this afternoon that we were all Pennsylvania Dutch here, but I find still a few Scotch-Irish left. Now, let us all take a rising vote on this question, Pennsylvania Dutch and Scotch-Irish together.

The motion was carried by a unanimous rising vote.

The SECRETARY: I had hoped we might be able to hear from Dr. Hill tonight, but it is now after ten o'clock, so we have made arrangements with the Stock Breeders and the Dairy Union to have him occupy the third period tomorrow morning, when he will speak to us on the subject of the Agricultural Guild.

Subsequently, Dr. Hill read the following paper:

AGRICULTURAL GUILD.

By DR. WILLIAM HILL, *Chicago, Ill.*

Mr. Chairman, Ladies and Gentlemen: When your Secretary, Mr. Critchfield, asked me to come over here to Pennsylvania and tell you about the educational work for Agriculture that we have started in Chicago, I told him I would do so, but that I should expect to get infinitely more from the enterprising farmers and teachers of Pennsylvania than I was able to give. I have been at your sessions of yesterday and this morning, and in every one of them I have been

more than gratified, and have found that their contribution to my enlightenment is vastly greater than I can hope, by my contribution, to add to yours. One of the things that impressed me particularly, was what Dr. Hunt said before he began to talk, and I shall follow his example, and say a few words on the last topic before I begin to talk.

The last remarks made by the speaker, and the speaker on the floor, in reference to the necessity of taking some line of work, and then sticking to it, is one of the features to be preached to the American people today. It is the one thing I have emphasized in my class work at the Chicago University for the past ten years. Why do we go to Europe for our cattle and horses? Simply because the American has not been a continuous performer. It is horses this year, cattle next year: Percherons, then Trotters; Short-horns today, Herefords tomorrow—a hotch-potch that nobody wants, and we are going outside, and putting millions of good dollars every year into those countries, where son follows father along a certain line and gets results. If we want to get results in America, we must follow their example, and breed either Percherons, or Belgians, either Jerseys or Holsteins, either the Trotter or the Coach horse. Set your standard high; determine to make it the best that can be made, and then try to reach it. Teach your son to love the stock and follow you; go to the city market and study the best there is there; show your neighbors the way, and do something that will help you and help them. With set ideals, with a definite determination to do the best you can, there can be no question about the results. The trouble here in America has been that we have found this policy too hard. We have been trying to make something that the other fellow has not got—something that would give us the advantage; so we have failed both ways. At the old Quaker Sunday-school that I attended when I was a boy, I learned a text: "he that saveth his life shall lose it; he that loseth his life for My sake will find it."

I don't intend to preach a sermon this morning, I simply want to apply it. When we go out and try to get something for nothing—when we chase the dollar so hard that we forget the quality of our work, instead of getting the dollar we are chasing, we lose it. We lose our life when we are trying to save it. We think only of the dollar, and how to make it, and allow our work to become careless, and we lose both. When a man says "I am going to do good work; I am going to do the best I can; I am going to work at something that should be done, and do it well," the pay will come. That has been my observation. It is one of the most important economic principles I was able to develop at Harvard, and later in teaching Economics, but even better than college teaching, is the teaching that I have gotten on the farm, working out this principle. I have been on the farm, working out these things for the dollar, and also for the results, and from my experience I can say that the man who will set a high standard, and do the work the best that it can be done, is more likely to get good results and profits, than the man who goes out to get profits and neglect the quality of his work.

Now, there is another thing I want to say before I begin, and that is: I cannot boast of Pennsylvania Dutch ancestry, but I can trace back to Pennsylvania Quaker ancestry for about two hundred years—

SECRETARY CRITCHFIELD: We are proud of both lines.

Now, I will begin. The Agricultural Guild was organized about a year ago at the University of Chicago. It is simply an attempt to co-ordinate the forces now at work for the agricultural education and betterment. The great development of this nation for the last half century, and particularly within the last, say, ten years, has come about through a better organization of the educational forces. The business methods which have been applied in the building of large railroads, starting with little lines disconnected lines, joined together to make better service possible, have not been applied to agriculture. Eleven lines were joined together to make the New York Central lines, and thousands of smaller lines all over the country united to make a better service possible and they lowered freight rates from 3c per ton mile to ¾c per ton mile—a combination and organization which was productive of great good to manufacturers, and eliminated the enormous freight rates due to competition. I am not here to talk about combinations, but I will say just one word about that great American problem—not the greatest. We have spent much energy in attacking that problem in the wrong way. We have tried to stop it and prevent combination. We have tried to maintain the old, individual competitive system, the day of which has passed. We will never again see the day of individual competition. The day of the combination has come to stay, but it will not be the day of unrestrained combination. We should be prepared to renounce this individuality, and not to commence the attempt to restrain this natural tendency, which, thoroughly controlled, will bring about beneficial results. What must be done is what our President and some of his advisers, have been trying for several years to do—with partial success—to so control these combinations that they will not only make a few successful promoters rich beyond the dreams of avarice, but be successfully distributed among all the members of the community whose cooperation is necessary to produce the results.

Now, coming again to my text, studying these principles, and teaching railway, banking, and other forms of them in the University of Chicago, and, of course, Economics in Agriculture, led me to see the relation between agriculture and other interests, and to see the difference in it. The farmer works as an individual, instead of having the benefits of combination, as do the railroads, the factories, the bankers, who see more clearly the necessity of this. In the whole scheme of things the farmer has the least protection. The land is the foundation on which all the great superstructure that has been built up in America rests. And because the natural conditions were so favorable to agriculture, and our resources so rich, it has been possible for the farmer to produce easily under conditions that would have driven the business man into combination long ago. He has been able to produce under the old individual system; although the daily tendency has been toward combination instead of competition, the farmer has been allowed to do as he pleased, and continue the system of individual competition. They only work together to serve their own interests. Our neighbor over here breeds Chester Whites, and is successful; this makes his neighbor a little jealous, and, in order to be looked upon as a leader, he

takes to breeding Berkshires. What is the result? People who come in from the outside get in some instances Chester Whites, while others get Berkshires; the same thing holds true in cattle, and in horses. Now, when a man wants to buy Jersey cattle, or horses of a certain kind, or anything of a particular breed, where does he go? He goes into the neighborhood where these things are bred, rather than to some individual breeder. This is well illustrated in Wisconsin, where through the influence of the Agricultural College and "Hoard's Dairyman," the farmers have been breeding a particular strain for two or three generations. You will find men there who have bred Holsteins, or Chester Whites, or Jerseys, or Percherons, or Belgians, for two or three generations, and they are successful; people know they will get what they want when they go into those neighborhoods where they have been bred.

The great thing about Agricultural Colleges is the co-operation and co-ordination of the existing agricultural forces, and that is our plan in forming the Guild—to use co-operation and co-ordination of the forces already existing. Now, what does the University furnish; what does the farm owner furnish, and what does the student furnish? It is the co-operation and co-ordination of these three forces, and, I might add a fourth, which is more important than any of them, and that is the Agricultural Colleges, the men who are leading the way to agricultural education. That is the Guild, and the combination on which it rests. It is not undertaken to duplicate the work which the Agricultural Colleges and the other interests are doing, but to supplement them.

A number of wealthy, successful business men of Chicago have bought farms outside the city, as the tendency of the day is. Some of them were men who had grown up on the farm but had not lived on it. They had been driven from the farm by the natural tendency which has prevailed during the last forty years. What were these forces that tended to drive men from the farm? What is the economic reason which has changed the American people from 95 per cent. rural fifty years ago to 50 per cent. rural today? Why are all the people today in Russia and China living on the land? Why are practically all the people in Mississippi living on the land? Simply because the economic efficiency or productive capacity of the individual is low. When one person can produce only enough to feed himself, there is no possibility of artistic and literary development or any development which makes for the cultured side of life. In the hard, pioneer conditions, when we were struggling to feed ourselves, our farms on the stony lands of New England and of Pennsylvania, New York and Ohio produced practically all, and the energy of the people was necessarily directed to the production of feed enough to supply the necessaries of life. With the opening of the pioneer prairies of the West, came the invention of farm machinery, and better plows and harrows and harvesters took the place of the cradle and the sickle and the scythe, and all of that farm machinery is the product of inventive American brains; and the ingenuity of the American inventors has been largely increased by the growing demands of the farmer for more and better machinery; all this has made it possible for the farmer to have many things that were formerly denied him—possible for him to make use of the artistic and luxurious development of the last half century.

The economic cause of the movement of the State from agriculture to industry, is the increasing efficiency of American farm labor through machinery, and through better land on which to apply his labor. Today, one man feeds not two or three, as he did in pioneer days, and as he does today in Russia, India, China, and Mississippi, but he feeds a hundred. The teeming thousands of New York and Chicago, the teeming centers of America, and of the old world, are largely fed by our American farmer. So it is perfectly natural that we should have people moving from the country to the city.

In the economic movement from the country to the city, what elements are most likely to shift? Is it the bright and efficient labor that passes from the old industry to the new, or is it the man who is less active, more satisfied with existing conditions, more ready to do what he is doing, and what his father did? I need not answer that question. The energy and brains and efficient leadership of the last half century has been centered in the cities; it has built our railroads and established our commerce established our cities, and made the United States occupy the position it holds today, of the crowning nation of the world. And the farms are the superstructure on which this nation is built; they are the foundation upon which all this energy and power which makes for the leaders of the world, rests. But in what condition has that movement out of agriculture, left agriculture? What has been the status of the farm? One often hears it said that the farm is a good place to be born, and to grow up on if you get away soon enough. Today, the business man who has had all the success the business world can give, is beginning to say that the farm is a good place to return to, and the sooner he can get back to the farm, the better. One of the successful men—a member of our Agricultural Guild—said to me (I had been spending the day with him most pleasantly at his beautiful farm, among his fine Guernsey cattle)—"I count every day lost that I must go into the city." The conditions under which a man can live, under which his children can grow up, the contact with Nature, and the absence of all the artificial, that goes best with city life, makes it natural that any sane man, who has seen all the attractions that city life can give, should long to return to the simpler and more wholesome conditions of the country. This tendency to return to the country is very strong today. It is necessary to understand these forces to see how the Guild developed.

A number of these men who have gone from the farm, and have made a success in the city, have now decided that they will make their homes in the country, and there spend their declining days where their children can grow up on the farms about Chicago. Many of them expected to apply the business methods which brought them success in building railroads, or banking, or commercial life, to these farms. What difficulties did they encounter, these men who have moved from the city to the country? First, the serious dearth of good dairymen, men capable of taking charge of their herds of fine cattle, and of men capable of carrying out the orders such men give. If a man of this kind wanted to build a railroad, he could hire men to carry out his orders, and construct according to his plans. Where can you find such a man in agriculture? What proportion of education is necessary to equip a man so that he will be competent to perform these duties? Do our Agricultural Colleges educate a man for

this? Many of these men have had agricultural college graduates on their farms to take charge of some of the departments on these farms. With what results? In most cases, with disastrous results —in some cases, extremely disastrous. One of these men a year before the Guild was organized went to the leading Agricultural Colleges of the West for a man to take charge of his high class dairy and farm. A graduate was recommended to him who was said to be the best in his class, and, in addition to that, had had a considerable amount of practical training. This man was employed at a good salary, and given charge of the farm. A practical man, with little college training had given up the position because of the illness of his father. When he left, the herd of one hundred cows was producing on an average, about eighten pounds of milk per day. Records were kept, and the herd was in good condition. This college graduate had charge of the herd a little less than three months. At the end of that period, the average production was eleven pounds per day. When he left, the records were in such a shape that nothing could be told about the condition of the farm, and, worse even than that, from a moral standpoint, bills amounting to eighteen hundred dollars, which had been supposed to have been paid from month to month, had been covered up to make a showing. A carload of cattle, which this man had been sent to a neighboring city to select, had been bought at a very high price, and at the end of a years' time, only three of them proved to be worth anything—worth keeping in the herd. Of course, this is an extreme case of the inefficiency and dishonesty of a college graduate. I would not take it as a typical case, but a number of instances, not so striking, followed from placing in responsible positions University men, making it difficult to get any man who has been operating a farm by proxy to want to get college men.

That was the status I found when we organized the Guild. One thing I have learned at our colleges: that the men who have had all this theoretical training which the colleges afford, when they have gone into positions for which they have been recommended, have failed so dismally, that we have decided not to recommend for positions of responsibility, any of our graduates, until they had had a reasonable amount of practical training and experience. It was to secure this practical experience that the Guild was organized. It was to give these men, college men and others, an opportunity to fit themselves for the management of others' farms, or possibly their own, that this work of the Guild was undertaken. We cover two sides of need: the need of the student to have the opportunity to get this practical training to fit him for the responsibility to be placed upon him, and the need of the farmer, whom either lack of knowledge of agricultural conditions, or pressure of other business, prevents from taking charge of his own farm. So, when some of these men and their neighbors came to me and said "what can you do to help us; what can you suggest?" I gave them the results of my own experience. I grew up on the farm. I had never been away from the farm until I went to college; when I finished college, I went to teaching agriculture along with these other economic subjects, and at the same time had charge of the old farm of five hundred acres. I had the same kind of experience as those I have just

told you. I had, in a number of instances, taken men who wanted to learn how to farm, to do the work on my farm, under my own supervision, but after a year or so, when he had become competent to take charge of the work, he would want more money than the proceeds of my farm enabled me to pay, and he went to one of the agriculturists who could pay him more. I probably do not need to define to this audience the difference between an agriculturist and a farmer; the agriculturist is the man who made his money in town and spends it in the country, while the farmer is the man who makes his money in the country, and spends it in town. From my own experience, I had decided to do some experimenting, and secure a young man who had some college training, and eight or ten years' practical experience, to take charge of my farm; and after talking the matter over with these gentlemen, I decided to let my farm be used for the purposes of training young men, so that after they had the theoretical part, they could get two or three years' practical experience on the farm, under proper guidance, and, then, when they were competent to take positions of trust, positions would be found for them. It was simply trying to do systematically what we had been doing unsystematically. I suggested to these men that if they would allow their farms to be used for this training, they would receive benefits, as well as the students, because it was so hard to get reliable laborers for their farms. Ten farm owners, whose farms were near together, about Chicago, undertook each a specialty in some particular line. The University was to get them expert advice from the Agricultural Colleges and successful farmers, as to what lines should be undertaken on each farm, due to the relative condition of the farm. A superintendent was put in charge of each farm; the requirements were, his practical ability to make that farm a prosperous farm. I put that first, because I have observed the methods of educational men in their business training. Second, a theoretical, scientific and technical training, which would enable him to plan the work on that farm and conduct it in such a way that every man was working under him would have the advantages he could get from doing the work in the right way. We learn how to do by doing. Third, business sense and judgment. That, perhaps, would be a subhead under the first practical requirement, which was making a prosperous farm. You will find men who can grow good crops, but do not know how to market them. Then, another important requirement is enthusiasm, and love of the work they are doing, and effort to inspire the men who are working under them with this love of the work, so that the whole organization would move them to good spirit and eagerness to accomplish the best results.

You will readily recognize that such a combination is rare, and that you cannot find every day men who combine these qualities, and I frankly and sorrowfully confess that we have not as yet found a man who can anything like come up to these requirements—but that is what we are trying to do and to train men for.

Numerous applications came in. We selected a number of men and started them to work on the different farms we had in the meantime secured. Some of these men had the idea that a good many college graduates, and perhaps a good many more graduates of non-agricultural colleges have than of Agricultural Colleges—that their

education fitted them to tell other people what to do, instead of doing it themselves, bnt, upon their application, I impressed upon them by numerous letters this first condition, this first reqnirement: "Yon will begin at the bottom, and do the hardest and most disagreeable work of the farm, for two reasons; first, to see that you really can do it, and second, to see as to your staying qualities—to see if you really want to do farming, and the hard disagreeable duties of farm life. If you can't we can't afford to put up with you; we are selecting the men who have practically decided that the practical in agriculture is more to their liking than teaching in an Agricultural College, or professional or commercial pursuits open to them." I really think that any man who has carefully considered the opportunities, and then decides that he wants to make this his life work—if he wants to make farming his life work, gets more opportunities for development, good health and pleasure than he could win in any other walk of life, or in any one of the many openings that are offered everywhere in America. I don't mean that he will become actually wealthy, but he will be sure of a good living, and, to a great extent, of a good home, and a good, wholesome, healthy life. What are your children going to be if they grow up in the slums of the dity? If you are really in earnest and want to enter onr work, I will give you two years to prove it in."

Immediately after our plan was advertised, I received a letter from Minnesota, from a young business man, who said he had graduated at Yale five years before; he had enough money to buy a farm, and was offered the management of a large ranch, but before buying a farm, or undertaking the management of another man's farm, he wanted to qualify himself to do the work intelligently. He knew nothing about it, whatever. We have generally taken the view that any one is able to run a farm; men have gone into this work without anything like the training that would be required in any other work. Everybody knows the training that is required of engineers and professional men, but we have not thonght it necessary for farming. This man was a college graduate, and he knew that if he wanted to go into farming, he must get a wider experience than he had. I did not encourage him to come; I told him he wonld have to do the hardest and most disagreeable work on the farm. This did not discourage him, and he came down from Minneapolis to see me and I emphasized it even more strongly. That did not deter him; he came, and out in his time one half of each day in putting the books into excellent shape, and the other half he learned how to mark the plow and do all the other things that the successful farmer must do in order to accomplish anything. He worked through the summer, and then we advised him to take a technical training in one of our Agricultural Colleges; he is there now, and by next spring expects to be ready to take a position. That man was getting several thousand dollars a year salary, and is now prepared to be one of the best kind of farm managers.

Another instance: A young man who was receiving a good salary from one of the large automobile companies, wrote me. I told him what I had told the other man, but he was not discouraged. He came to Chicago to see me from Cleveland. He had never been on

a farm, but was determined to get on the farm. He had followed his father in the shops, and had watched the effect. His father was getting several thousand dollars, and he, himself had been there eight years and was getting eighteen hundred dollars. I said to him "the profession in which you now are offers greater opportunities than you will have in farm work; at your age (he was now 28) you have an excellent start, aud you will not make in farming anything like the amount you are now getting." He said "I can live on the farm without that much." I reminded him of the hard and disagreeable work he would have to do on the farm. He went home and thought the matter over, and then decided to come. He resigned his position with this company, which sent him all over the country to design new parts for automobiles. Here was one of the suggestive things he said to me: he said, "they are always hurrying me; we are always under pressure, and I never have time to get things out." He said he had to hurry and get things out for this year, and then go ahead and make changes, so as to make people want to buy new machines next year. This young man was an artist, and had the artist's sense of work. He said: "I want to do something, where I can do something worth while, and do it well, and I am now going to see whether horticulture and poultry won't give me a comfortable living. I am investing my own money, which I have saved, and I want to make the experiment." When he came to resign his position, the company was so anxious to keep him that they offered him three thousand dollars a year. He was not one of the discards of the manufacturing world, but was offered three times the salary the average farmer makes in a year. I told him that unless he was unusually successful in farming, he could never hope to make the same amount in farming. That made no difference; he was determined to try it for at least a year, and, then, he said, he would have the satisfaction of either knowing that he could do it, or that he must go back to the shop.

These are two practical illustrations of the class of city men that come to us. Now, about college men. We had ten graduates of the best agricultural colleges in the country in the Guild the first year. Three of them fell off quickly. One of them it seems, had been on the farm, and knew how to do farm work, but was not willing to do it, and wanted to tell us how to run the farm. There were plenty of things to criticise on these farms; there always are. He was always criticising, aud wantiug to get iuto a responsible position at once; so we let him go. Two others fell by the way because they had not the physical strength to farm, or willingness to do the work mapped out. The other men, five of whom had farm experience, had grown up on good farms, and then had a college training, went to work at the bottom, at twenty-five dollars a month. Within a month they were advanced to thirty, and worked for that for two or three months, advancing from time to time, until today those men, with only six months training in the Guild, are in positions that give them opportunity for growth and development, and they are getting very comfortable salaries. We expect to pay all a man is worth, but we distinctly emphasize the quality of the work, rather than pay for it. I say to these young men "you can get more money by teaching, or going on the farm of some wealthy man who does not know much your services are worth to him, but you will not

get the practical experience; if you want to get into contact with the best men, and are determined to go into Agriculture, we have the best inducement to offer." If your business associatins are such that you want to take up this work, we want your energy and time and your brains, to help us to elevate the status of Agriculture."

PROF. HAMILTON: I have no voice, but I want to emphasize the point made by Dr. Hill. I tell you that in agriculture, as in everything else, practical education is essential. I am appealed to time after time by men in position to employ managers, and they say "where can I find a man who can take charge of my farm and not break me up?" Our Agricultural Colleges do not yet turn out such men. A man came to me and said "where can I find a manager for my fine estate, and a hundred fine cows. I told him of a young man whose name had been mentioned to me, who knows the theories all right, is a graduate of an agricultural college, but whether he will get up at half-past four any morning, and put his men to work, or whether he has business capacity to sell the products of the farm, I don't know; or whether he is able to manage men, or direct them in the practical management of the farm, I don't know, and nobody knows; the young man himself did not know. That is the risk you are running." He employed him, and the young man failed.

Another man came to me some time ago, who owns a farm of over nine hundred acres, and over a hundred fine Jersey cattle—everything to make an ideal place, and he said "I feel like selling everything I've got and getting away." He said "I can't get a manager for my farm. Early in the morning there will come a knock at my door, and there will be the manager, who says "the gasoline engine won't work; what shall I do?" and then I have to get up and go down and fix it. The next day he says "the cow, Daisy, is sick; I wish you would come down and look at her." He was undertaking to manage the farm, but didn't know how. He was like an engineer who knows enough to open the valve, but not enough to run the engine, and when anything goes wrong, he calls out the passengers and says "what do you think is the matter, anyhow?" When you get a manager, you want one who knows how to do everything from start to finish. When I first went to State College, I expected to start in doing two or three hours work in the afternoon, but he said to me "clean out the cow stables." It had not been cleaned out during vacation, but I started in, and cleaned it out. I want to say today that no Agricultural College is an Agricultural College unless it has from twenty-five to fifty farms—dairy farms, stock breeding farms, poultry farms, truck farms—every branch of farming, so that the young fellow can start out and get practical work, as well as theory. He is there two years, and has kept books to show what has been done by him, so that when a man comes and asks for a young man to manage his farm, you can say to him "Smith is the man you want." "How do you know?" "Here is his record, and he is worth all you can pay him." In this way you can be sure of not making a mistake when you recommend a young man as manager of a fine estate.

I hope our Agricultural Colleges will follow what has been undertaken by the University of Chicago, and establish farms on which

the young men shall go and get practical training, as well as theoretical training in the class rooms.

My father graduated at Jefferson college, and afterwards studied medicine, but he never practiced it. When he came home he saw things were in such a condition that he had to stay home and take hold, but, he said, "I was a man, and did not know the difference between a shoulder and a ham." Now, a man may have the theory of things, but unless he has actually done them with his hands, he will find his theory of little avail. He must be practical, as well as theoretical. I was down in Virginia a number of years ago, and was making a speech to a number of old farmers down near Culpepper, and they gathered round there, and at last, during the dinner hour, one of them said to me "did you ever farm?" "Well," I said, "I have two or three farms up there in Pennsylvania." "Oh," he said, "that is not what I want to know; did you ever work at it with your hands?" And there was the point: was I competent to give advice? He knew that if I had not worked with my hands, I could not do so—I was not competent to give advice anywhere. Now, that is what we want—men who can talk about the science of Agriculture, and also make it profitable as a business.

MR. STOUT: I move we adjourn.

This motion was properly seconded, and duly carried in the regular way, and the State Board of Agriculture adjourned to meet again at the call of the Secretary.

N. B. Critchfield

Secretary.